

LIGHTING AFRICA

Catalyzing Markets for Modern Lighting

Kenya

Qualitative Off-Grid Lighting Market Assessment

October 2008

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1. LIGHTING AFRICA OVERVIEW/ MARKET INTELLIGENCE PROGRAM



1. What is Lighting Africa?

Lighting Africa is a World Bank – IFC initiative aimed at supporting the global lighting industry to catalyze a robust market for off-grid lighting products tailored to the needs of African consumers.

The Program's mission is to make affordable, environmentally sustainable, durable, and safe lighting available to the masses, who currently depend on kerosene lanterns and candles to satisfy their lighting needs.

How does Lighting Africa support the development the lighting market?



The Lighting Africa program is a **market-based** approach, grounded in the recognition that:

- There is a considerable **commercial market opportunity** and willingness to pay for off-grid lighting, substantiated by annual expenditures on kerosene amounting to \$38 billion and \$17 billion, globally and in Sub-Saharan Africa, respectively
- Recent **technological advancements in lighting**, particularly in the area of Light-Emitting Diodes (LEDs), demonstrate increased promise to deliver affordable technological solutions tailored to the African marketplace and beyond
- The most expedient and sustainable way to bring affordable, reliable lighting to Africa is by **supporting the industry** to design and deliver an array of products tailored to the needs of African consumers

How do we ensure Lighting Africa program activities respond to industry need?



All Lighting Africa program activities are designed *with* and *for* the industry and other stakeholders

Through *ongoing consultation* with a wide array of stakeholders (including private companies, NGOs, financiers, governments and other key players along the supply chain) opportunities are identified where Lighting Africa can play an appropriate role in accelerating the off-grid lighting market in Africa



Lighting Africa: Program Areas

- **Policy:** Addressing policy and regulatory barriers
- **Financing:** Improving access to finance along the distribution chain- for example through partnership with financial institutions
- **Product Quality Assurance:** Addressing issues of quality with lighting products to help consumers make informed purchase decisions and prevent market spoilage
- **Business-to-Business Linkages:** Creating opportunities for different players along international supply chain to meet, exchange information and create business partnerships
- **Market Intelligence:** Collecting & disseminating key market information to support successful market penetration
- **Business Environment:** Facilitating market entry through the provision of relevant information, such as country-specific policy and regulatory information



What will the market research provide?

Key Market Information on consumer needs, preferences and finances. The information will:

- Inform on the desired functionality and design attributes of different types of lighting products within several different product classes (Torch, Floodlight, Task Light, Lantern, Spot Light)
- Enable the industry to overcome potential challenges that are likely to accompany market entry in the African off-grid lighting market
- Create a baseline to quantify the size of potential market segments in volume and value terms

Structure of Market Research Work



- Currently the Lighting Africa market research program covers:
 - 5 countries: Ghana, Kenya, Zambia, Ethiopia and Tanzania
 - 2 key market segments: households & micro-businesses in rural and urban areas
- The research is divided into two phases:
 - **Surveys** on consumer lighting uses, preferences, and expenditures
 - In-depth **product testing** by focus groups



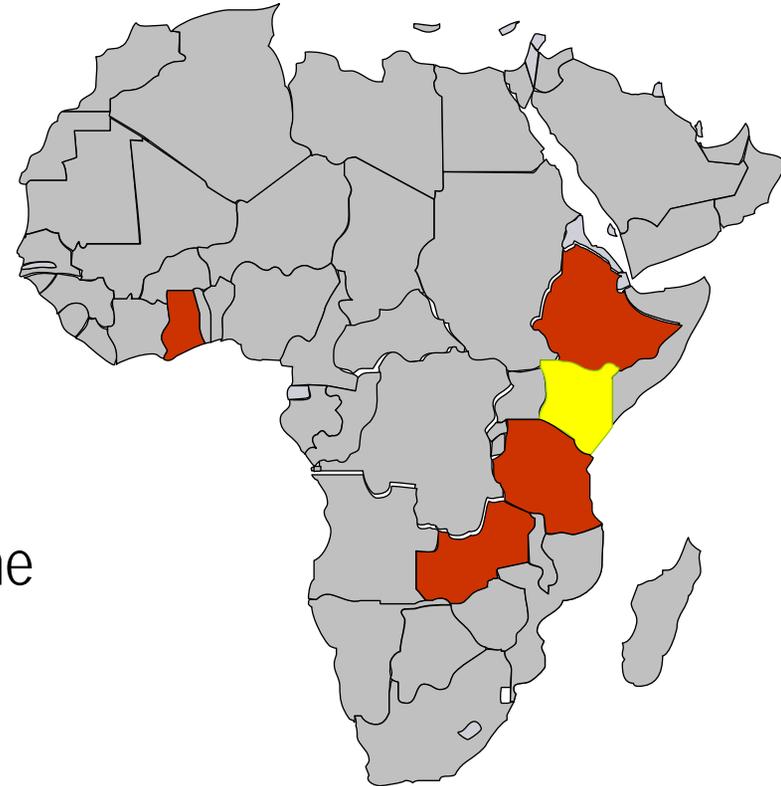
Lighting Africa: Why Market Research?

- While anecdotal evidence shows a substantial opportunity in the off-grid lighting market in Africa, much of the industry lacks the information needed to develop and market products appropriate to meet the needs of African consumers
- This is the result of a premature and undeveloped market, but one with demonstrable potential – **the fuel-based lighting market in Africa is currently worth more than \$17 billion per year** – yet is still largely undefined, untapped, and unrealized
- In response to the industry's call to provide greater comprehension to the scope of this emergent market opportunity, Lighting Africa developed a **Market Research** program

Qualitative Research Phase: Stage 1



- This report summarizes the **qualitative** findings of the first research phase for **Kenya**.
- Analogous studies are available at www.lightingafrica.org for the other 4 countries.
- Lighting Africa will soon issue the following complementary reports
 1. **Quantitative** analyses for each of the 5 countries
 2. A **cross-country summary** report
 3. Results of the in-depth **focus group product tests**





2. MARKET RESEARCH APPROACH

Research International: Background and Related Experience



The research was conducted by the Research International Africa, a subsidiary of the global market research firm, Research International, the world's largest custom market research agency, with offices in 50 countries worldwide and 30 years of expertise.



- The market study involves studies of the market in Africa to provide insights that form the basis for innovative product ideas; and is comprised of two primary research methods:
 - An **Exploratory phase** involving a desk study of existing data on the market and a Habits and Attitudes survey of the population
 - **Concept testing, using the proprietary eValue** methodology, to quantify the acceptance and likely uptake of existing, new and revised product ideas for the market in Africa



- The test sample included 2 key market segments: (i) urban and rural households and (ii) urban and rural micro-businesses
- Interview respondents in each segment were selected at random in the following representative locations: Addis Ababa, Butajira, Debre Birhan and Nazareth



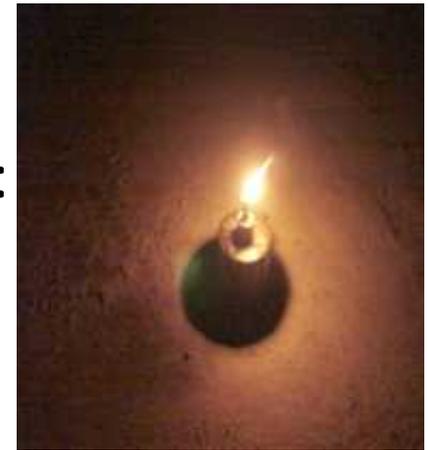
- Researchers conducted **55 in-depth, structured interviews** to gather information on current lighting practices, attitudes toward current lighting products, and perceptions of modern lighting products, etc
- **2** different test products were left for **3** nights with each respondent so they could evaluate them in the context of their daily lighting needs
- Researchers returned after 3 nights and invited respondents to complete a callback questionnaire on their experience with the test products

Key Types of Consumer Information Collected



The market research interviews generate the following country-specific consumer information:

- Who are the consumers?
- How do consumers presently utilize light?
- What do consumers want in terms of the amount and type of light needed to satisfy their lighting needs?
- Which products do consumers prefer?
- How much are consumers willing to pay for different kinds of lighting products?





Products Tested

LANTERN
Dynamo or mains power,
rechargeable battery



LIGHT SOURCE
White LED

TORCH
Solar, rechargeable
battery



LIGHT SOURCE
White LED

Products Tested



TASK LIGHT
Lantern & Torch
Solar, rechargeable
battery



LIGHT SOURCE
CFL and LED

TASK LIGHT
Mains power or
replaceable battery



LIGHT SOURCE
White LED

Products Tested

TORCH
Replaceable battery



LIGHT SOURCE
White LED

FLOOD LIGHT
Solar, rechargeable
battery



LIGHT SOURCE
Linear fluorescent

SPOT LIGHT
Solar, rechargeable
battery



LIGHT SOURCE
White LED



3. DEFINING THE KENIAN CONSUMER



3. Lighting Consumers: Households



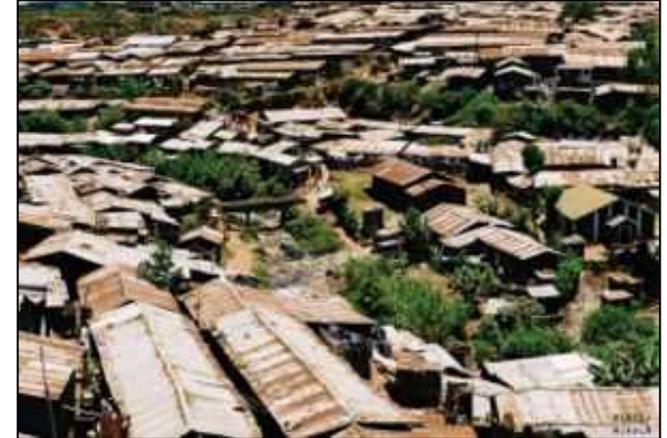


Urban Dwellings

LSM 1-4

- In urban areas among this social class dwellings mostly consist of a single room.
- Typically the room is partitioned to separate the kitchen from the living area.
- Households normally have about 5 family members.

“...it’s a one room wood and iron sheet structure, but it’s partitioned by using a large cloth.”
--Male, 26, urban, Kibera, Nairobi



- Houses are severely overcrowded with little or no space between one house and the next.
- Materials most commonly used for houses are mud, board, tin, plastic, recycled metal barrels, cement and sticks. Homes have corrugated iron sheet roofing.
- Drainage in informal settlements is very poor, with only deep trenches to allow for water flow.



Rural Dwellings

- Rural dwellings in this social class are small and consist of about 2 rooms, usually separated with a sheet to form a sleeping area and living area.
- Houses are made from mud mixed with cow dung, and roofing from the same or from grass thatching, and supported with wooden pillars.
- For those with a bit more money, the houses are built using iron sheets. They are very hot during the dry season.
- Households normally consist of about 5 family members.





Rural Dwellings

LSM 5-12

- Rural higher social classes have dwellings consisting of 4 to 7 rooms. They have a living room, a kitchen, a bathroom/toilet, and bedrooms.
- Rural houses tend to be on bigger pieces of land with a subsistence farming area.
- Households are usually occupied by families of 5 and more members, and may include members of the extended family, usually grandparents.



“[we have 5 rooms] ... a sitting room, two bedrooms, kitchen and the bathroom.”

--Male, 47, rural household, Kihingo, Nyeri



Kitchen and Cooking Area

- **Cooking in urban (LSM 1-4) households is done in one-room houses that are partitioned with a bed sheets to provides a separate cooking area.**
- **Rural households mostly have their kitchens outside the main house. Kitchens are normally permanently constructed structures made from timber or iron sheets.**
- **In the higher social classes, kitchens are part of the main house.**



Urban kitchen corner, Kibera, Nairobi



Rural kitchen



Dwelling Spaces

Bathroom and Toilet Facilities

- In urban informal settlements, bathroom and toilet facilities are shared with neighbors.
- Toilets typically are pit latrines.
- Sometimes people use plastic bags (known as ‘*flying toilets*’). They discard these along the roads with other trash. This mostly happens at night when it’s dark and people are afraid to go outside to use the shared facilities due to the high level of insecurity.
- In rural areas, toilets and bathrooms may be located in the main house, but in most dwellings in the lower social classes (LSM 1-4) they are outside, but not shared with other households. These are usually pit latrines.



Rural pit latrine

“When I need to go to the loo in the middle of the night it’s cumbersome because instead of just hitting a switch, I have to wake up and start looking for the matchbox to light the lamp.”

--Male, 26, urban, Kibera-Laini Saba, Nairobi



LSM 1-4

- Most urban consumers in this social class tend to have their own small micro-businesses.
- The day begins early in the morning (5 a.m.) when it is still dark outside. Families prepare children for school, do chores, and make breakfast before they go to work.
- Household members are back to the house by 5 or 6 p.m. after which they prepare supper, eat with the family, do more household chores and relax.
- The family retires to bed after 9 p.m.

“I wake up at 5 a.m. and light my jiko to warm my kids’ bathing water. As they shower I make them tea then help them get ready for school, ensure they have breakfast, then escort them to school, after which I start preparing my snacks.

At around 8 a.m. I set up my stall outside the house where I sell my snacks until 11 a.m. I then head back to the house to prepare lunch. At around 3 p.m. I head to the school to pick my kids... I offer them some snacks or porridge whatever is available then at around 5 p.m. when the kids are doing their home work I head to the market to shop.

I start preparing supper at 6 p.m. so that by 7 p.m. supper is ready and no kid sleeps without eating. By 9 p.m. we go to bed.”

--Female, 37, Urban household, LSM 3, Majengo, Mombasa



LSM 1-4

- Rural consumers in this social class have similar days to their counterparts in the urban areas. They may start their day a little later, usually at 6 a.m. when it's still dark.
- These consumers are mostly employed. They may wake up later than the urban consumers because they do not have to report to work until 8 a.m.

“My day begins at 6 a.m. That’s the time I wake up then take a bath, after which I dress up, have breakfast and leave for work by 7 a.m. I’m supposed to be in the office by 8 a.m. My days are more of the same routine until 5 p.m. At 5 p.m. I leave the office for home. I get home at around 6 p.m. At around 8 p.m. supper is ready and after supper we head to bed.”

--Male, 40, Rural household, LSM 1-4, Shariani, Kilifi

LSM 5-12

- Among rural consumers, the younger generation tends to be employed.
- Older consumers are retired or working on farms. Their days start from 5 to 6 a.m.

“After waking up [at 5] I head to the farm depending on the season. I carry out my tasks until 10 a.m. when my wife brings me porridge. After breakfast I carry on with my business until noon then break for lunch. Back at the homestead I have lunch then take a nap under my cashew nut tree until 4 p.m. Afterwards I head back to the farm to finish on the days tasks. At around 6 p.m. I return home, take a shower thereafter catch up with the family’s on goings during the day.”

--Male, 44, Rural household, LSM 8-10, Kibaoni, Kilifi



Weekends and Days Off

- Most urban consumers run their own micro-businesses. They tend to work 7 days a week to make ends meet, this being their only source of income.
- They work fewer hours on Sundays, using the time off to go to church, do laundry, visit friends and relatives or go to the beauty salon (females).

“I don’t have time for leisure activities because the family is fully dependent on me. I have to work the entire week to put food on the table.”

--Female, 49, Urban household, LSM 1-4, Majengo, Mombasa

- Rural consumers are mostly employed and have Sundays off. On Sundays they visit friends and relatives, go to church and relax at home with the family.
- This also applies to the older rural folk who are not employed, but work on their farms or are retired.

“Most of my weekends I’m always working but when I’m off duty I normally relax at home just listening to music. On Sunday we go to church with the family in the morning. Then after church we at times go to the beach or visit our relatives...”

--Male, 30, Rural household, LSM 3, Kaloleni, Kilifi



Day-to-Day Challenges

LSM 1-4

- The main challenge facing this social group across the urban and rural area is providing food for the family. Since the general elections in December 2007, prices of essential commodities have risen and those on lower incomes are struggling more than ever.

“Currently life is very tough for single parents like me. I even don’t know what we will do because even the essential products’ prices such as maize meal have risen to ksh.58. This rise is enormous.”

--Female, 49, Urban household, LSM 3, Majengo, Mombasa

- Food items such as maize meal, cooking oil and vegetables are a priority in most households. Meat is a luxury to many and is purchased on special occasions. Other essential purchases are paraffin for lanterns and *jiko*’s (cooking stoves), and matchboxes.

“Maize flour, sugar, paraffin, beans, water (borehole water bought off donkey carts) and cooking oil are the main products that we must have.”

--Male, 28, Rural household, LSM 1-4, Ganze, Kilifi



Day-to-Day Challenges

LSM 5-12

- These social groups also feel the effects of the rise in prices after the general elections held in December 2007. Providing 3 meals a day for their families is a priority. The most common purchases mentioned in these households are maize meal, vegetables, cooking oil and sugar.
- For those with a job shopping is usually done after pay day, which is either at the end of the month or every 15 days in fluctuating income situations. Those unemployed or running their own small businesses shop more often using their daily or weekly earnings.
- None of the respondents across the social segments spontaneously mentioned lighting itself as a challenge they face in their daily lives. However, they did mention the high cost of paraffin for their lanterns.

“I do shop for the entire house on a fortnight basis after receiving my wages.”

--Male, 36, Rural household, LSM 7, Shauri Moyo, Kilifi



Consumer Aspirations

- Consumers across the various social groups in the urban and rural areas have similar aspirations. The most commonly mentioned is to provide their children with good education so that they can be independent in future.
- Other aspirations mentioned: start a family; expand the business; get a job or a better job; buy land and build a house; and, move into a bigger house.

“I hope to expand my business and maybe have children.”

--Male, 40, Rural household, LSM 5-8, Mbagaini, Nyeri

“I would really love to see my children through college and expand my business.”

--Female, Rural household, Ngori, Kajiado

“I wish to see my business prosper and my children finish their education and have a better life than mine.”

--Male, Rural household, LSM 9-12, Kihingo, Nyeri

“It’s my prayer that my children have a good education.”

--Male, 28, Rural household, LSM 1-4, Ganze, Kilifi

“My future aspiration is to expand my business if not get a job myself .”

--Female, 37, Urban household, LSM 3, Majengo, Mombasa



3. Lighting Consumers: Trade

Urban

Urban trade is usually in the form of:

- Kiosks selling fruits and vegetables
- Small shops dealing in household commodities
- Small cafés
- Roadside snack sellers
- Hawkers

Rural

Rural businesses comprise:

- Small shops selling household commodities
- Small restaurants
- Hawkers
- Kiosks selling fruits and vegetables



Urban Trade Premises

- These are usually one-roomed structures made from iron sheets or timber. Within informal settlements, the businesses are joined to the main dwelling house of the owner and partitioned using shelves or a door.
- In informal settlements, people have micro-businesses. They have set up makeshift storefronts along the footpaths. These are shacks constructed of mud walls and corrugated tin roofs.



A grains shop in Kibera, Nairobi

“It’s one room, but I have partitioned it. Behind the shelves is where we have our sleeping area and the cooking area and the sitting room is on the side.”

--Male, 40, Urban trade, Small shop, Kibera, Nairobi

“This business premises occupies one room and the other room is used as the bedroom cum the visitors room.” -- Male, 32, Urban trade, Small shop, Majengo, Nairobi



Rural Trade Premises

- Rural trade tends to have more permanent structures with bigger space and from 1 to 3 rooms.
- Roadside businesses are popular in the rural areas with structures made from sticks and tin roofs.

“Currently I just have two rooms. The main business area and the store.”

--Male, 32, Rural trade, Kiosk, Mavueni, Kilifi



Shops in rural Kenya



Roadside business structures in rural Kenya, Kisumu



Toilets

- **Businesses in rural and urban areas usually do not have their own toilets. In permanent structures toilets are shared with other tenants of a building.**
- **In open air markets, toilets are built by the city council for use by all, and sometimes charge a fee.**

“I have a toilet behind the kiosk.”

--Female, Rural trade, Kiosk, Majengo B, Kajiado

“We have a toilet and bathroom, but it’s a little far from here.”

--Male, 40, Urban trade, Small shop, Kibera, Nairobi

“I have to go to the public toilet and pay for the services.”

--Female, 24, Rural trade, Kiosk, Ruringu, Nyeri



Shared toilets in an urban trading center, Nairobi



Lighting Consumer Summary

- **Dwellings in the urban informal settlements are small with usually a single room. They require at most 2 lighting devices to be used in the main living area and also to go to the toilet/bathroom (usually outside the main house).**
- **Urban dwellings tend to be bigger and with more rooms. Lighting for these needs to be able to cover a big area and bright enough to cover an entire room.**
- **Household consumers spend their days at work. They come back to the house in the evening. Lighting therefore is not required for most of the day.**
- **In business premises, operating hours mostly extend into the dark hours, hence requiring light for 2 or 3 hours at night. With adequate, reliable and cheaper lighting, businesses would be able to extend their operating hours.**
- **Due to the rise in prices for most household commodities, getting household necessities is a struggle for a majority. Paraffin, which is used for cooking stoves and lighting is becoming expensive to buy (cost of ksh.30 for 300 ml).**



4. CURRENT LIGHTING BEHAVIORS

4. Lighting Behaviours: Household Hours



Morning

- Most households start their day early. Lighting is needed for about 1 hour to prepare for the day's activities.
- In the morning, lighting priority is given to the kitchen or cooking area as breakfast is prepared.

Evening

- Lights are turned on from around 6:30 p.m. until bedtime around 10:00 p.m. An average of 4 hours of lighting is used in the evening.
- The living room gets lighting priority as this is where most of the household activities take place, e.g. reading, children doing their schoolwork, entertaining guests, relaxing with the family and eating.
- In urban informal settlements, lanterns are kept on all night. Mothers with small babies prefer to keep the lights on so that when they wake up to breast feed or change their babies at night they can see what they are doing and not have to go through the long process of lighting the lamp. The lamp is kept on dim and the light increased when needed.

Lighting Behaviours: Household Hours



Locations

- **Households with more than one occupant will normally have 2 lighting devices, with one for use in the kitchen and the other for the living room. The one for the kitchen is left on only for the duration of the cooking.**
- **In other rooms lighting is turned on as and when needed.**
- **The toilet is lit for the shortest period in a household.**



Household Lighting Hours

“ We put on the light at 7 a.m. in the evening and put it off at around 11 p.m. when the kids have finished studying.”

--Female, Rural household, LSM 5-8, Ngori, Kajiado

“It normally runs for the entire night because we have rats around and we use the light to keep them away.”

--Male, 45, Urban household, LSM 3, Majengo, Nairobi

“I use the lantern for the main room. It’s also used for studying, but the tin lamp is used in the cooking area.”

--Female, 37, Urban household, LSM 3, Majengo, Mombasa





4. Lighting Behaviors: Trade

- Lighting in businesses is used early in the morning for about 1 hour. Most businesses operate from 6a.m. until dark. In the evening, lights are used for about 3 hours from 6 p.m. until closing time, usually 9 p.m.
- A single lighting device is normally used in business premises. In the case of premises with more than one room, the lighting device is carried where needed, thus leaving the front room without light.
- Open air market traders rely on sunlight and are forced to close when darkness sets in, due to lack of security and scarcity of customers.
- Better lighting would give traders and customers a sense of security and businesses would be able to open until late.

Open air market, rural Kenya, Kajiado



“I put it on at about 6 a.m. [to] 7.30 a.m.

... I light it at around 6.30 p.m. and switch it off at around 9 p.m. when we are heading home...”

--Male, 34, urban trade, Food kiosk, Gikomba, Nairobi

“The light I usually use (paraffin lamp) is not bright so it gets very dark. If there was sufficient light I wouldn't be afraid.” --Female, rural trade, Kiosk, Majengo B, Kajiado



Urban Trade Operating Hours

Urban traders begin their day early in the morning before sunrise. They open their businesses between 5 a.m. and 6 a.m. and close from 9 p.m. when it's dark, mostly 7 days a week.

Most traders would like to open until later but are unable to do so due to:

- Lack of customers after dark
- Poor lighting
- Lack of security
- High cost of paraffin (*ksh.30 for 300 ml*) for lanterns

“I open at 6 a.m. in the morning and close at 8 p.m. in the evening, reasons being those are the times clients are available and also it's safe enough to travel from point of stay to the shop. As regards the closing time it's due to the poor lighting that I have.”

--Female, Urban trade, Shop, Kawangware, Nairobi

“I put into consideration that I have to buy extra paraffin and the price of paraffin is high, this makes me not extend my hours.”

--Male, 40, Urban trade, Small shop, Kibera, Nairobi

“I get to the kiosk at 5 a.m....we operate until 9 p.m.”

--Male, 34, Urban trade, Food kiosk, Gikomba, Nairobi



Rural Trade Operating Hours

- Rural traders operate 7 days a week mostly from 6 a.m., when it's still a dark until 9 p.m. Most would like to stay open later into the night. Due to insecurity, lack of customers, poor lighting and the high cost of paraffin, they are forced to close early.
- Better lighting would encourage some traders to stay open later, as this would enable them and their customers see better and also give a sense of security.

“I do not feel secure opening late into the night.”

--Female, 24, Rural trade, Kiosk, Ruringu, Nyeri

“I do open from Monday to Monday because I solely depend on my business for survival.”

--Male, 30, Rural trade, Kiosk, Mwembeni, Kilifi

“With my current lighting device I'm comfortable closing at 9 p.m. but if I had an improved lighting I would be motivated to extend my business hours. As you can see in this market most of us operate on tin lamp, therefore an improved would give me an advantage above others.”

--Male, 34, Rural trade, Shop, Mavueni, Kilifi



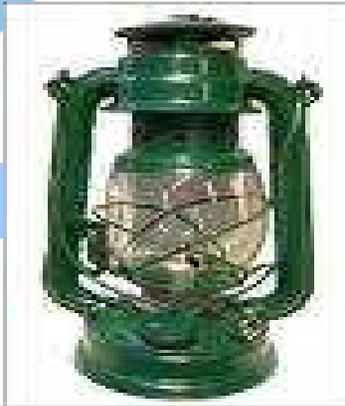
Summary of Lighting Hours

- **Lighting in households is required mostly for 1 hour in the morning to serve the household while preparing for the day's activities, and again in the evening for about 4 hours.**
- **During the day, most members of a household are out at work or school and therefore do not require lighting. Also, the sunlight is adequate for a house at this time.**
- **The same applies to businesses, which use light for 1 hour in the morning and for about 2 to 3 hours in the evening.**
- **Operating hours would be increased with better lighting.**



5. CURRENT LIGHTING PRODUCTS & EXPENDITURES

5. Lighting Products and Expenses



Paraffin lamp



Mains power from
Kenya Power &
Lighting Co.



Pressurized kerosene lamp



Tin lamp



Torch



Candle



Currency Conversion Rate

▪ Kenya **USD 1 = KES 65**

**Approximate, as of May 2008*



Paraffin and Tin Lamps

Usage

Most common form of lighting in urban and rural areas, used in trade premises as well as in households.

Advantages

- Paraffin is widely available and the lamps are cheap at about ksh.30 each for the tin lamps. The glass lamps sell at about ksh.300 – 500.
- They are portable, which makes them easy to move from place to place within a household and another advantage of the paraffin lamp is that the light can be regulated.

Disadvantages

- Poor light intensity: they are dim and the light emitted is not enough to illuminate an entire room.
- Produce a lot of smoke that blackens the ceiling.
- High cost: paraffin is usually sold in soda bottles at ksh.30 for 300 ml and ksh40 for 500 ml.
- Fragile, especially when cleaning. Often crack or break when they get too hot. Traders must close their shops to go buy a new glass for the lamp.

Paraffin and Tin Lamps



- Emit too much heat especially in an enclosed room making it uncomfortable.
- One has to move around the house with a lantern in order to illuminate the rooms.
- Can easily cause fire if mishandled.
- Must be cleaned before use as they collect soot, hence takes a lot of time before use.
- If left unattended the flame increases by itself and could crack the glass.
- The tin lamps rust when exposed to water or moisture for long periods.
- Paraffin lamps are the most common form of lighting used in households and trade premises. This is largely due to the wide availability of paraffin and the low cost of the lamps. Though the most commonly used, these lamps are not the most preferred due to their numerous disadvantages relating to health and cost of paraffin.

“If not well taken care of it can easily cause fire.”
--Male, 28, Rural household, LSM 1-4, Ganze, Kilifi



Kerosene Pressure Lamps

Usage

- Pressure lamps are used in urban and rural areas in trade premises and in households, mostly in higher social classes (LSM 9-12).
- Users like them due to their “bright” light.

Disadvantages

- They may explode easily due to the pressure, and hence are considered dangerous.
- They are expensive for most people to purchase (around ksh.900 each)
- Cost of fuel is high.
- The light they emit is too bright [glare]; it hurts the eyes.
- Not easy to carry around due to the weight as well as the delicate wick.
- They take too much effort to use – they have to be pumped before they are lit.
- Pressure lamps require frequent maintenance for them to operate properly.

It takes a lot of my money when it comes to fueling it and the light is usually too bright. Its safety also makes me concerned because I have heard of many stories about how pressure lamps have exploded.” -- Male, 47, Rural household, LSM 9-12

“ “The wicks are very delicate after they have been used once, they could even be blown away by wind. It also requires frequent maintenance for it to light properly and last longer.” -- Male, Nairobi trade, Shop

“...at times the light from the pressure lamp is too bright and makes the eyes tired.” -- Female, Rural household

Mains Power (Electricity)

Usage

- Preferred form of lighting for many who aspire to obtain it in future. Others have no plans to install electricity due to its high costs, which is the reason that many people do not use it. For others the choice of electricity is not an option because the main grid has not reached their areas.
- Electricity has multiple functions: it provides light and also operates electrical appliances such as radios and TVs.
- It's very easy to use as one only needs to switch on and off to get light and it can light several rooms at once.
- The amount of light it emits is good and is also considered safe by many.

Disadvantages

- Power cuts, especially when it rains.
- Expensive to install as wiring is required
- Lengthy process of application to the national provider, KPLC.
- Expensive on monthly bills, especially for cooking.
- If one is renting their business premises or house, consent from the landlord has to be obtained before installation, thus delaying the process.
- May need to offer an unofficial incentive to get connected locally.

“No, there are no plans to connect to the mains because I can not afford.”
--Female, Urban household, LSM 1-4, Kibera, Nairobi

“I think with electricity life will be easier than it is currently.”
--Male, 28, Rural household, LSM 9-10



Usage

- Candles are mainly used as backup for electricity or lanterns, when paraffin has run out. Though easily and widely available, they are not commonly used as a main lighting device in a household or even in a business premise.

Disadvantages

- The light they emit is dim.
- They leave wax, dirtying surfaces.
- They burn off very quickly, making them expensive because many are used.
- They are easily blown out by the wind, an inconvenience in shops.
- They lack stability and can easily cause fire (especially with children around).

“We use a candle once in a while when there is shortage of paraffin at the vendors.”

--Male, 47, Rural household LSM 9-12

“It (candle) doesn’t last very long, especially bad quality candles can burn very fast.”

--Female, 27, Rural trade, Open air market



Usage

Torches are only used when searching for items around the house or the shop or when visiting the toilets/bathrooms at night. They are owned by a few.

Disadvantages

- Batteries are expensive .
- Batteries are not long-lasting.

“The torch is used in rare occasions when visiting the latrine or seeing off a visitor after dark.”

--Male, 44, Rural household, LSM 8-10

Summary of Lighting Products Presently in Use



	ADVANTAGES	DISADVANTAGES
Paraffin and Tin Lamps	<ul style="list-style-type: none">-Easy to maintain-Cheap to purchase-Can regulate light intensity	<ul style="list-style-type: none">-Poor lighting and durability-High fuel cost-Too much smoke: creates soot on ceiling-Fragile
Pressure Lamps	<ul style="list-style-type: none">-Bright light	<ul style="list-style-type: none">-Expensive to purchase and to fuel-Hard to maintain-Fragile due to glass parts-Not safe (can explode)-Difficult to move around-The bright light makes the eyes tired
Mains Power (Electricity)	<ul style="list-style-type: none">-Easy to use-Good lighting intensity	<ul style="list-style-type: none">-Requires wiring-High payment bill-Power outages
Candles	<ul style="list-style-type: none">-Easily available-Cheap to purchase	<ul style="list-style-type: none">-Easily blown out by wind-Insufficient light-Not long lasting
Torch	<ul style="list-style-type: none">-Easy to use-Portable	<ul style="list-style-type: none">-Expensive to purchase batteries



Environmental Considerations

- Most respondents are not aware of the negative effects of lighting devices to the environment. It is not a factor that many take into consideration when choosing a lighting product.
- For the few that are aware of the effects, it is difficult for them to consider this because there are not many affordable lighting products from which to choose in the market.
- Lack of variety and costs of products forces people to keep using paraffin lamps, even though some are aware that they are not good for the environment.

“I am not sure, but I think the candle is bad [for the environment] with all the wax that it leaves behind.”

--Male, 47, Rural household, LSM 9-12

Health Beliefs and Reported Effects



Consumers worry about the lighting products they use.

They report health effects, such as:

- Coughing caused by smoke and fumes.
- Soot in the nostrils after using paraffin and tin lamps.
- Straining of eyes and poor eyesight caused by pressure lamps.
- Itchy eyes caused by smoke emitted by lamps.

Negative health effects are mostly caused by paraffin lamps and tin lamps. However, respondents continue to use them because they cannot afford safer products.

“At times it (paraffin lamp) produces smoke which I think affects us because like when I wake up in the morning and wipe my nostrils with a cloth, I wipe off black stuff.”

--Male, 40, Urban trade, Kiosk, Kibera, Nairobi

“I don’t like the smoke emitted by the tin lamp. It irritates the nose.”

--Male, 30, Rural household, LSM 3, Kaloleni, Kilifi

“Because of continued use of the lamp I wear spectacles.”

--Female, Rural household, LSM 5-8, Ngori, Kajiado



6. Consumer response to Modern, Off-Grid Lighting Products





6. Lantern: Solar, LED (bi-level)

Advantages

- Attractive and easily identifiable as a lamp
- Produces no fumes or heat
- Rechargeable battery
- Easy to use and charge
- Adjustable light intensity
- Portable
- Uses solar energy to charge, hence saving on costs
- Stable on a flat surface
- Can be suspended to light a bigger area

“I think it’s a good product because it’s all about reusing of solar energy. It’s a great idea because all one needs is sunlight to keep the lighting device running.”

--Male, 34, Urban trade, Food kiosk, Gikomba, Nairobi

“It’s quite safe compared to the paraffin lamp. You will not be worried to find the house burnt if you leave it with the kids.”

--Male, 45, Urban household, LSM 3, Majengo, Nairobi



“I think it would meet my needs because it’s bigger than my tin lamp.”

--Female, 38, Urban trade, Kiosk, Tudor, Mombasa

“I think the handle is very useful if you have a place to hook it.”

--Female, 38, Urban trade, Fixed hawker, Tudor, Mombasa



Lantern: Solar, LED (bi-level)

Disadvantages

- Fragile glass, not tightly held in its position
- Dim light
- Batteries not easily available.
- Does not indicate when charging is complete
- Danger of being stolen when left outside to charge

“I don’t think it’s reliable because I kept it in the sun and I didn’t know if it was charging or not. When evening came it was dim.”

--Male, 30, Rural trade, Small shop, Mavueni, Kilifi

“It’s quite dim and not satisfying.”

--Male, 30, Rural household, LSM 8, Shauri Moyo, Kilifi

“The glass is very thick hindering the lamp from emitting enough light.”

--Male, 34, Urban trade, Food kiosk, Gikomba, Nairobi



“Security is a major issue because if you don’t find a position where people cannot easily reach then you will have to wait the whole day for it to charge.”

--Male, 34, Urban trade, Food kiosk, Gikomba, Nairobi

Lantern: Solar, CFL

Advantages

- Durable (made from hard material)
- Easy to use
- Rechargeable battery is cost effective
- Very attractive
- Good size and portable
- Light intensity is good and can be regulated
- Does not affect eyesight
- Easily recognized as a lamp
- Stable on a flat surface
- Environmentally friendly (no fumes)

“I would be more than willing to buy such a product provided I can afford the price because I already like the size and the fact that I don’t need paraffin to operate it.”
--Female, 49, Urban household, LSM 1-4, Majengo, Mombasa



“Easier than lighting a tin lamp.”
--Male, 30, Urban household, LSM 3, Kaloleni, Nairobi

“Its glass looks very clear and I consider that an attribute of a bright lighting device.”
--Female, 37, Urban household, LSM 3, Majengo, Mombasa

“I would be interested in buying such a product for my kids to use while studying.”
--Male, 44, Rural household, LSM 7, Kibaoni, Kilifi



Lantern: Solar, CFL

Disadvantages

- Looks expensive
- Can be stolen when left outside to charge
- Does not keep charge for long. It's not reliable: it worked for only 1 hour after an entire day of charging.
- Cannot be recharged during bad weather and so cannot be used every day.
- Difficult to tell when it is charging



“I think the panel should have a longer cable so that one can put it on the roof and leave the lantern indoors to charge when away with no fear of it being stolen.”

--Female, 49, Urban household, LSM3, Majengo, Mombasa

“It did not keep charge for long and it couldn't recharge during bad weather.”

--Male, 40, Urban trade, Small shop, Kibera, Nairobi

“I think it would take me longer charging this lamp with this panel than a panel with a bigger surface.” -- Female, 37, Urban household, LSM 3, Majengo, Mombasa



Lantern: Dynamo, LED

Advantages

- Multipurpose usage. Phone charging seen as benefit.
- Economical: mechanical charging.
- Easy to handle
- Adequate light intensity
- Good size, does not require a lot of space
- Glass panel is protected when not in use (folds away)
- Stable base – can stand on its own
- Can function with or without either sunlight or electricity
- Environmentally friendly as does not emit smoke
- Charging done indoors so very secure
- Adjustable light intensity
- Handle good for hanging lantern, to spread the light



“Yes, I would like to use one of this because it can illuminate the entire house.”
--Male, Rural household, LSM 7, Shaurimoyo, Kilifi



Lantern: Dynamo, LED

Disadvantages

- Not durable due to pumping handle, which comes off while charging
- Recharge method is cumbersome
- Charging adapter does not fit normal sockets, which require 3 prongs and not 2
- Unfamiliar design: some thought it was a thermos
- Handle is too small
- Needs a lot of care due to its small size
- Recharging must be done often as charge does not last for long – about 2 hours
- No indicator to show when fully charged

“The issues of winding now and then would definitely raise problems in future. It would be tiresome for somebody of my mother’s age to wind it until it’s fully charged.”

--Male, 36, Rural household, LSM 7, Shaurimoyo, Kilifi

“The recharge method looks cumbersome, it will require a lot of time for it to be charged for 2 hours’ usage. The product also does not have a meter to indicate it’s fully charged. Knowing when it requires a recharge is tricky.” -- Female, Rural trade, Shop, Kakamega



“The winding system of the lamp will finally lead to its breakdown.”

--Male, 32, Rural trade, Small shop, Mavueni, Kilifi



Task Light: Solar, CFL

Advantages

- Although expectations were different, respondents found that the product produces adequate amount of light and traders were able to extend their hours
- Economical due to rechargeable battery and solar recharging
- Attractive and easy to handle, despite unfamiliar design for a lighting device
- Multipurpose: can be used as a torch when going to the toilet or as a lantern to light a room
- Environmentally friendly as it has no fumes
- Stable on a flat surface
- Easy to charge by placing in the sun

“The handle is very useful to hook up the lamp.”
--Male, 32, Rural trade, Small shop, Mavueni, Kilifi



“It’s very easy (to use). I don’t need special education to switch it on and off.”

--Male, 44, Rural household, LSM 7, Kibaoni, Kilifi

“Looks like a very strong torch.”
--Female, Rural trade, Kiosk, Majengo B, Kajiado



Task Light: Solar, CFL

Disadvantages

- Perceived to need a lot of care: solar flap can break easily
- Produces too much heat at night
- Charging process a concern due to the fact that the product needs to be left outside - theft very likely.
- Not functional in cloudy weather when it cannot be charged



Task Light: Replaceable battery, LED



Advantages

- Attractive
- Good size
- Stable on a flat surface
- Portable
- Reliable, so as long as it has batteries
- Good light intensity
- Easy to use
- Very safe to leave unattended because it can't cause fire
- Environmentally friendly and health friendly because it does not emit smoke
- Handle allows easy movement without blocking light



“It actually looks fit for my children to read with.”
--Male, 47, Rural household, LSM 9-12, Kihingo, Nyeri

“The children would read comfortably because I can see it has a lot of light from the many bulbs. I would also use it on the table when I serve the food. It can be of great help.”
--Female, Rural household, LSM 5-8, Ngori, Kajiado

Task Light: Replaceable battery, LED



Disadvantages

- Expensive on batteries—they do not last long.
- Bulky
- Can only be used as a spot light, not to illuminate an entire room



“These batteries never last for long.”
--Female, 24, Rural trade, Kiosk,
Ruringu, Nyeri

“...can’t tell it is a light. You would even think it is a doctor’s instrument. You wouldn’t know its work if you are not told.”
--Female, Rural household, LSM 5-8,
Ngori, Kajiado

“I would have preferred a rechargeable battery.”
--Male, 32, Urban trade, Shop,
Majengo, Nairobi

“I prefer my paraffin lamp because paraffin is cheaper than batteries.”
--Male, 40, Urban trade, Small shop, Kibera,
Nairobi

“The plastic looks weak especially at the joints.”
--Male, 28, Urban trade, Fixed
hawker, Kibera, Nairobi



Torch: Solar, LED

Advantages

- Portable – ideal for going to the toilet in the dark
- Perceived to be affordable
- Durable – the plastic material feels hard and hence long lasting
- Easy to use and charge
- Bright light
- Cost effective -- no need for batteries
- Good grip - fits nicely in hand



“It would meet the needs I would need a torch for.”

--Male, 45, Urban household, LSM 3, Majengo, Nairobi

“It fits well in the hand because of the good design.”

--Female, 38, Urban trade, Fixed hawker, Tudor, Mombasa

“It’s generally good because it consists of no bulbs. It’s different from other torches because it’s rechargeable.

Its design allows it to fit well in the hand.”

--Male, 45, Urban household, LSM 3, Majengo, Nairobi

“It can not illuminate the entire business premise. I think it would be sufficient for lighting my path home and visiting the latrine after dark.”

--Female, 38, Urban trade, Kiosk, Tudor, Mombasa



Torch: Solar, LED

Disadvantages

- Little product security during charging as must be put outside
- Not practical for trade premises and households as one would have to hold it while carrying out other activities
- Panel may not be replaceable or repairable if damaged



“If it slips from the hand and falls, then the panel is damaged, then what next?”
--Female, 38, Urban trade, Fixed hawker, Tudor, Mombasa

“Considering my case charging would be a problem because where I live houses are very close to each other so there isn’t direct sunlight.”
--Male, 26, Urban household, LSM 2, Kibera, Nairobi

Torch: Replaceable battery, LED



Advantages

- Portable – ideal for walking home from work when dark as well as for toilet/bathroom visits
- Durable – made from strong material
- Easy to use
- Bright lighting
- Good grip because of its texture



“Considering its weight I think it’s a very strong product.”

--Male, 28, Rural household, LSM 1-4, Ganze, Kilifi

“It seems to produce enough light because of the numerous light bulbs inside.”

--Female, Rural household, LSM 5-8, Ngori, Kajiado

Very durable, even if dropped it wouldn’t get spoilt.”

--Male, 49, Rural trade, Kiosk, Mukumu

“It can help me in the household especially when it’s at night and people want to go outside.”

--Female, Rural household, LSM 5-8, Ngori, Kajiado

Torch: Replaceable battery, LED

Disadvantages

- Perceived to be expensive to purchase
- Batteries not available in rural villages
- High chances of getting lost because it is small
- Batteries not rechargeable
- Expensive on batteries
- Can only light a specific area, not an entire room



Flood Light: Solar, Linear Fluorescent

Advantages

- Aspirational design: closest design akin to lamps powered by electricity
- Adequate light intensity
- Cost effective: no bill or battery cost
- Can act as an emergency light
- Can reduce electricity consumption
- Safe – does not have harmful emissions and cannot cause fire
- Reliable lighting – used for two days straight without any problems



This light was tested in businesses premises only

Flood Light: Solar, Linear Fluorescent



Disadvantages

- Perceived to be expensive
- Bulky
- Not portable
- Can easily be stolen if not fixed to the wall
- Perceived as hard to maintain: spare parts
- Mounting seen as a problem
- Looks delicate – a lot of care required while handling it due to the glass parts



“It looks like a complex electronic gadget.”
--Male, 28, Rural trade, Kiosk, Kihwaini, Nyeri

“The thing that would nag me is the mounting.”
--Female, 27, Rural trade, Open air market trader, Kajiado

“Its security while charging is a worrying factor.”
--Female, 30, Rural trade, Kiosk, Mavueni, Kilifi



Spot Light: Solar, LED

Disadvantages

- Unfamiliar design is not appropriate for a household or small business
- Not suited to the respondents: both in terms of image and their needs
- Hard to handle, cannot stand it or hang it
- Lacks a switch
- Inadequate light intensity
- Security fears when charging; it has to be left outside



“It lacks a stand making it difficult to position.”

--Female, 48, Rural household, LSM 4, Mukumu

“I would use this light as a torch but it is not easy to manage. I do not like the way it is molded.”

--Female, Rural trade, Shop, Kisumu

“It should have its own switch on and off button. As you said it works with the help of sunlight then how it is going to manage when there is no sunlight?”

--Male, 30, Rural household, LSM 8, Shaurimoyo, Kilifi



Lighting System Concept

Advantages

- It can light numerous rooms at once
- Easy to use
- Economical as uses solar energy
- No danger of forgetting to put it outside to charge as it is permanently outside, unlike the other products



“I think it just the product that I need for such a business because it would offer me with lighting and operate other devices.”

--Male, 30, Rural trade, Kiosk, Mwembeni, Kilifi

“I like it because it can light several rooms at once. I think installing would be cheaper than electricity for us who are far from the grid.”

--Male, 30, Rural household, LSM 3, Kaloleni, Kilifi

“I tend to think of it as an owner controlled and cheaper form of electricity.”

--Female, 49, Urban household, LSM 3, Majengo, Mombasa

“It satisfies several rooms without having to reposition it.”

--Male, 32, Urban trade, shop, Majengo, Nairobi



Lighting System Concept

Disadvantages

- Initial cost of purchasing panels perceived to be expensive
- **Not functional without sunlight**



“What happens if there is no sunshine for a week, do we go back to the tin lamps?”
--Female, 49, Urban household, LSM 3, Majengo, Mombasa



Suggested Marketing Activities

Respondents suggested ways to encourage local business to carry off-grid lighting:

- Road shows on market days – offer the opportunity to be shown how the products work and answer any questions.
- Give out free test samples.
- Employ agents to move the products around.
- Advertise on radio and television.
- Place the products at local outlets where many people can reach them easily, rather than have to travel to the major towns to get them.

“I would suggest that you advertise them on TV and Radio, and you can also provide samples and brief demonstrations as you are doing.”

--Male, 34, Urban trade, Food Kiosk, Gikomba, Nairobi

“I would prefer having a one to one session with an expert who would offer demonstration on how the product is used and answer any questions that I may have.”

--Female, 30, Trade, Shop

“I would suggest you place them with retail outlets in various region so that they can advertise the products on the companies behalf.”

--Male, 34, Rural trade, Shop, Mavueni, Kilifi

“I would prefer to get first hand information from a person I can relate to and maybe get to see it work my self .Therefore I would say placing it with a local outlet would convince me to use it.”-- Male, 34, Rural trade, Shop, Mavueni, Kilifi



7. SUMMARY & CONCLUSIONS

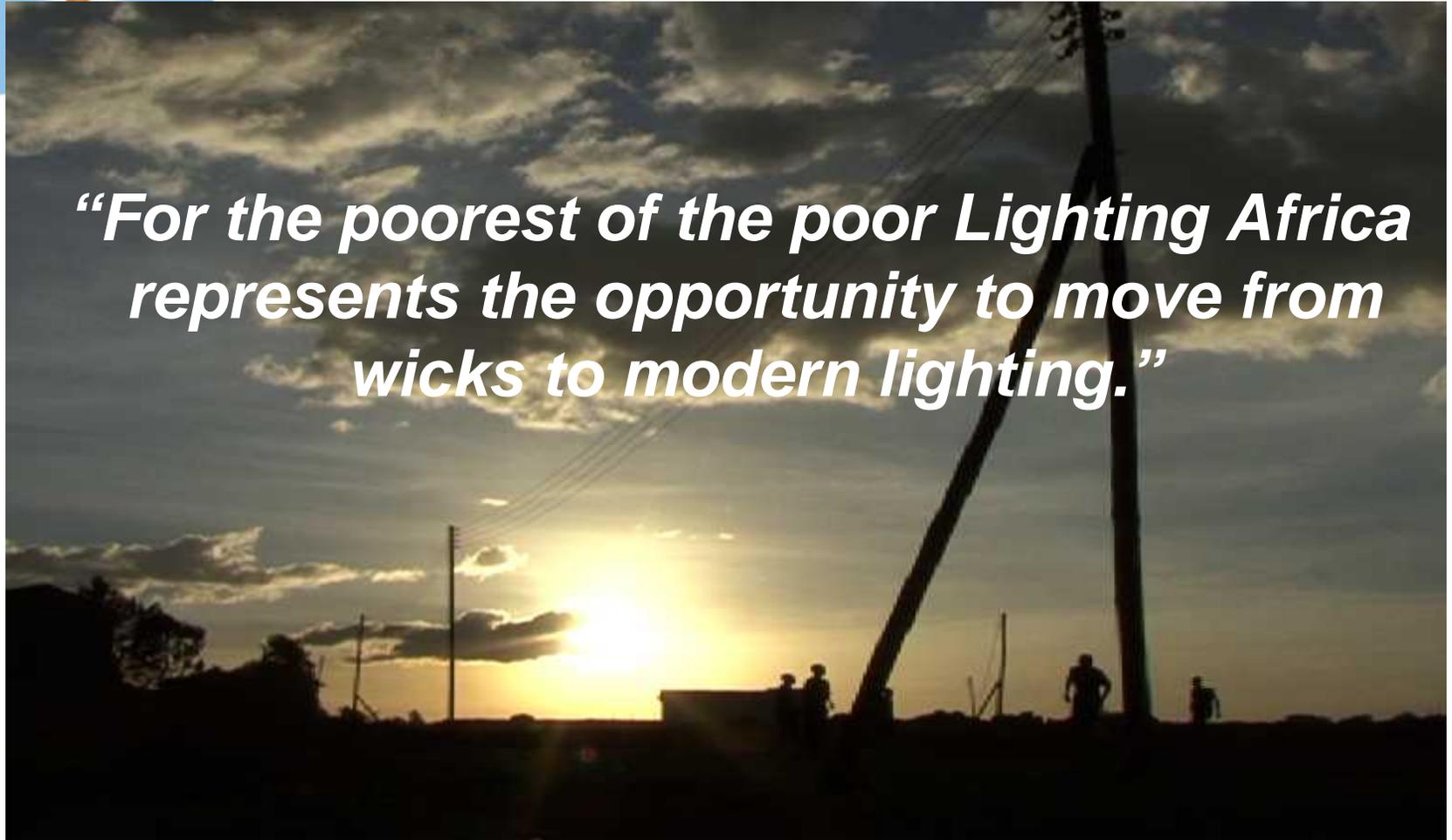
7. Summary and Conclusions

- **There is a significant opportunity for modern lighting products in Kenya because there is great dissatisfaction with fuel-based products presently used by a majority of consumers, both at home and at their trade premises.**
- **New products must be affordable because the priority among many is providing food and education to their families.**
- **A majority of respondents believe better lighting will have a positive effect on their daily lives. Households will be able to comfortably carry out activities, while businesses may be able to operate for longer hours.**
- **Batteries are expensive to most in Kenya, so many people choose not to own torches. The modern products using batteries were not popular with a majority due to this fact, considering that prices for most essential commodities have gone up. Batteries are considered a luxury.**
- **Solar rechargeable lanterns are the favored lighting device among the households and trade premises, due to sufficient light, familiar design and reliability. Additionally, it should lower consumers' lighting operating costs by reducing fuel purchases.**



Salient Thought

“For the poorest of the poor Lighting Africa represents the opportunity to move from wicks to modern lighting.”





- For more information about LIGHTING AFRICA, please visit the Lighting Africa website at www.lightingafrica.org
- Contact: info@lightingafrica.org

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The opinions stated pro and con regarding products shown or used in this market research study are solely those of the interviewees and do not reflect the opinion or endorsement of the interviewers, the sponsors or their respective staff. Researchers procured a variety of products with typical features to stimulate feedback from interviewees about lighting in general. Quotations are translated to English from the original language; they are not attributable to the individuals shown in the photos.

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