Solar Lanterns in Kenya
What Customers Want

A Study of the Features Demanded by Potential Lantern Buyers

Market Study Completed for

Intermediate Technology Consultants

May 1998

By
Fred Omondi Ochieng, Bernard Osawa,
Mark Hankins

Energy Alternatives AFRICA, Ltd
PO Box 76406
Nairobi, Kenya
Tel: 254-2- 714623
Fax:254-2- 720909
email: energyaf@iconnect.co.ke

Contents

Acknowledgments.

EAA wishes to sincerely acknowledge the support of IDE and ITC for support to complete this work. Special thanks to Vinoj Manning at IDE for the valuable inputs. Thanks also to Mike Hornsby for providing insights to the final questionnaire.

We acknowledge the support of ITDG and SCODE in facilitating the Nakuru Focus Group.

We also wish to heartily thank all the dealers that helped set up the focus groups in Nairobi, Nyeri, Meru and Nakuru. Without your help this exercise would not have been easy.

Thank you to Chloride and Sollatek who provided us with lists of dealers in the focus districts, and who provided useful letters of introduction.

Finally, we thank all of the Focus Group participants who took time out to provide this useful information.

Nairobi
May 30, 1998

1.0 INTRODUCTION

Energy Alternatives AFRICA was contracted by Intermediate Technology Consultants (ITC) and International Development Enterprises (IDE) to conduct two studies as a prelude to the introduction into the market of a solar lantern assembled in Kenya. The project itself follows the successful test marketing of seven prototype lanterns in the East African region carried out by EAA for ESMAP / World Bank in 1996.

During this test marketing exercise, it emerged that solar lanterns — if reasonably priced — would have a significant role in the provision of lighting for the rural poor. Even as solar PV continues to play a large part in the electrification of rural Kenya with thousands of home systems installed, solar lanterns have so far not seen any substantial dissemination. Players in the Kenyan solar PV sector have registered increasing sales ever since the introduction of amorphous 12 Wp modules during the early part of this decade. Evidence of the exponential growth of the a-Si market is provided by the number of stores dealing in solar equipment that keep are to be found in the Kenyan towns and villages.

The slow uptake of solar lanterns in Kenya and East Africa in general can be attributed to the relatively high costs of the lantern units currently in the market. High mark-ups, transportation costs and high duties paid in importing the solar lanterns raises prices beyond the reach of ordinary rural households. At present, the market for solar lanterns is to a large extent dominated by NGOs and other relief and development organizations working in the region. This means that the people who would be the prime target for the products are left to use their pressure, kerosene and wick lamps and have to contend with the unsteady and ever-increasing costs of kerosene / paraffin.

The amorphous module since its inception has had remarkable sales. The most common PV system in Kenya consists of a 12 Wp module used to run two lights, a TV set, a radio and two lights installed with either a 50 Ah solar or more commonly an automotive battery. Such a system retails for between Kshs 10,000 and Kshs 12,000 including the installation fee paid to the technician. Presently, solar lanterns in the market are sold at about the same price. This makes those who can afford it make a trade off between lantern units that will only light one room at a time and a complete solar household system.

The success of the prototype lanterns disseminated during the ESMAP / EAA project was as a result of their low pricing. The highest and lowest priced lanterns retailed for Kshs 5,000 and Kshs 2,000 respectively. These prices included the cost of small 5W to 10W modules used with the kits.

Survival surveys conducted over the last two years reveal that the majority of the lanterns are still in working condition. While end-users appreciate the fact that their lantern units have only a limited applicability (i.e. it cannot be used to power radios -- often the only source of information and entertainment for rural families), they admit that it has gone a long way in meeting their basic lighting needs and reducing their dependency on kerosene and dry-cells for torches.

It was with all this in mind that the idea of a locally assembled solar lantern was first mooted. For the lantern to be a success, it has first of all to be reasonably priced. Lantern aesthetics, duration and intensity of light output and other features which potential end-users would desire formed the major thrust of the focus group discussions.

2.0 METHODOLOGY

The focus group studies were conducted in four districts in Kenya namely; Nyeri, Meru, Nakuru and Nairobi. The first three districts were selected due to their high concentration and potential for solar PV. Nairobi was included in the study due to the fact that it presents the largest market for solar equipment. Large volumes of solar equipment are purchased in Nairobi for installation in rural areas. The studies were carried out in two stages; a written questionnaire and an oral section where the groups discussed their opinions verbally and voted by a show of hands on issues under discussion. The oral stages of the group meetings were recorded on tape.

The six lantern models used as demonstrations in the meetings were;
1. Solux (with small radio unit),
2. Solite,
3. Seo-Solar,
4. Soltech,
5. Kyocera 1 and
6. Kyocera 2 (similar to Kyocera 1 but incorporating an AC charger and a small radio unit)

2.1 Focus Group Selection and Composition

The study originally targeted low income rural groups, who are seen to be the major potential beneficiaries of solar lanterns. However a substantial portion of the market for solar lanterns is to be found with the higher middle and lower middle income groups who form 40% of the Kenyan population. Low income (poor) groups meant to be the main focus of the studies constitute 40% of the population. In reality though, only a very small percentage of this latter group would be able to afford the lantern on cash basis.

Logistically, it was quite difficult to conduct focus group meetings among the rural poor group. First, we relied on dealers in 2 of the areas studied to bring together interested individuals —– they tended to favour middle income groups. Secondly, it was difficult to get rural-based people to attend meetings in towns that were generally scheduled to begin at sunset and ran invariably up to eight or nine o'clock in the evening. This led to the relatively low number of women included in the focus group discussions. Thirdly, the low education levels widely associated with low income groups also meant that they would be unable to address adequately the issues to be deliberated upon.

In the end, we divided the focus groups into 3 general categories, all of whom have intimate links with their rural homes:

1. **Nairobi.** Urban dwellers with rural dependents or families. Upper middle class.
2. **Meru and Nyeri:** Urban based rural people. All of these have village homes. They ranged from upper to lower middle class.
3. **Nakuru.** Rural based low-income.

The closest group to the low income class was found in Nakuru where the respondents were eloquent, rural based people[1]. Views of the groups are presented together except in cases where their opinions were greatly varied.

The Nairobi group herein referred to as **urban dwellers with rural dependents/families** were selected with the assistance of dealers based in the city. This group was used as a test run and comprises of people who live in Nairobi but have homes in rural Kenya. Their responses during the entire course of the discussion were based upon lighting needs not in their urban homes but in the rural areas. In this group the majority did not have access to grid electricity at their rural homes.

The Nyeri and Meru participants were also selected with the help of PV dealers located in those areas. The focus group moderators also solicited the company of a few individuals met during the market chain supply study. The respondents in these two districts which in this analysis fall under **urban based rural dwellers** may have mains connection (where they live in the urban centers). At their rural homes though, solar home systems or solar lanterns are used together with pressure lamps or kerosene lamps.

The Nakuru group falls under rural based rural dwellers. The discussion was set up with the help of SCODE a grassroots development NGO with close links to ITDG Kenya.

2.2 General information on respondents

2.2.1 Age, Sex and Education level

The table below illustrates the average ages and the percentage composition of the group by ; sex and education levels.

Table 1: Group composition by age, sex and educational level.

Index	Age	Male %	Female %	Primary %	O-Levels %	A-Levels %	Diploma %	University %
Nairobi	31	71.4	28.6	N/A	N/A	N/A	N/A	N/A
Nyeri/Meru	32	78.8	21.2	12.1	39.4	24.2	3.0	18.2
Nakuru	33	61.5	38.5	7.7	30.8	15.4	15.4	7.7

[1] EAA is grateful to IT Kenya for connecting us to this group that they have been working with for some time.

2.2.2 Income and Current Energy Status

The following table shows the average income and the percentage composition of the group by sources of lighting used at present.

Table 2: Group composition by income and current source of light.

Index	Income p.a. (Ksh)	Mains electricity %	Solar system %	Solar lantern %
Nairobi	140,000	N/A	N/A	N/A
Nyeri/Meru	88,680	64	24	21
Nakuru	45,000	8	8	0

NB The Nairobi focus group was used as a test-run. The questionnaire was later amended to include the information on education levels and current energy status.

The high number of respondents with mains electricity in the Nyeri and Meru focus groups can be attributed to the fact that they responded to the question with the houses they live in town in their minds. That they use other sources of lighting in their rural homes will be aptly demonstrated in later sections of the report.

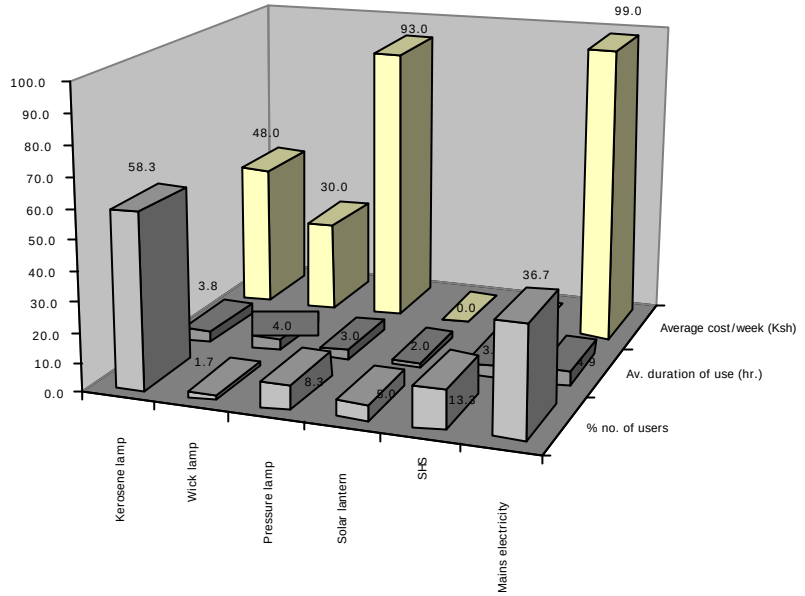
3.0 Light Usage

Respondents were asked what sources of light they use currently (at their rural homes). Due to the minimal differences in the answers registered from the four groups, the results have been presented together in this section.

3.1 Existing Light Sources

The chart below shows the light sources currently used by the respondents, their average duration of use per day and their weekly overheads on these sources of light.

Figure 1: Current sources, duration and cost of light used by the respondents



Torches (not included in the figure) are used by almost every member of the group discussions. They are used everyday for very short intermittent durations. People who use solar household systems (SHS) could not quantify the amounts of money they used to meet lighting costs.

3.2 Preferred Light Usage

Table 3 shows how the respondents' desired use the a solar lantern. The groups voted on the priorities they would accord each usage.

Table 3: Group prioritization and desired duration of use of a light source.

Light usage	% with maximum priority	Average duration per day (hours)*
Ambient lighting	38.3	5.2
Study / reading	38.3	3.6
Household chores	38.3	4.2
Security	36.7	9.2
Business	15	5.6

*This is based on the number of people who chose the light usage as maximum priority.

Ambient lighting, study and household chores were given the highest priorities. All female participants gave household chores maximum priority. Security in the rural based group received the lowest ranking with only 3 out of a possible 12 votes.

The respondents also gave the following answers in response to the question on why they thought people would purchase lantern kits to replace the light sources they currently use.

- Relies only on sunshine reducing or totally eliminating reliance upon expensive fuels.
- Cleaner, more environmentally friendly.
- Gives out a brighter light.
- Is modern technology and thus prestigious to use.
- Light softer on the eye.
- Less maintenance required.
- No smoke or bad smell emitted while in use.
- Produces less heat.
- Safer, minimal fire risks.
- Easier to operate.
- Is more portable and can replace torch.

However, the Nakuru group stressed that the uptake of solar lanterns for them would depend largely on the affordability of the units.

3.3 Light Duration Vs Quality

Four of the six lanterns were used in this section where participants were required to make a trade-off between the quality of light output and duration.
The lanterns used were the Kyocera 2 (Two 6W fluorescent tubes), Soltech (One 6W fluorescent tube), Solux (5W CFL) and Seo-Solar (7W CFL).

The lanterns were switched on and the groups voted on which light output they thought was best. They then ranked the outputs 1-4 in order of preference. Table 4 illustrates the percentages by choice . Results exclude the Nairobi group to whom the question was posed but used a different style to rank the lanterns.

Table 4: Percentage rankings of the four light emitting devices.

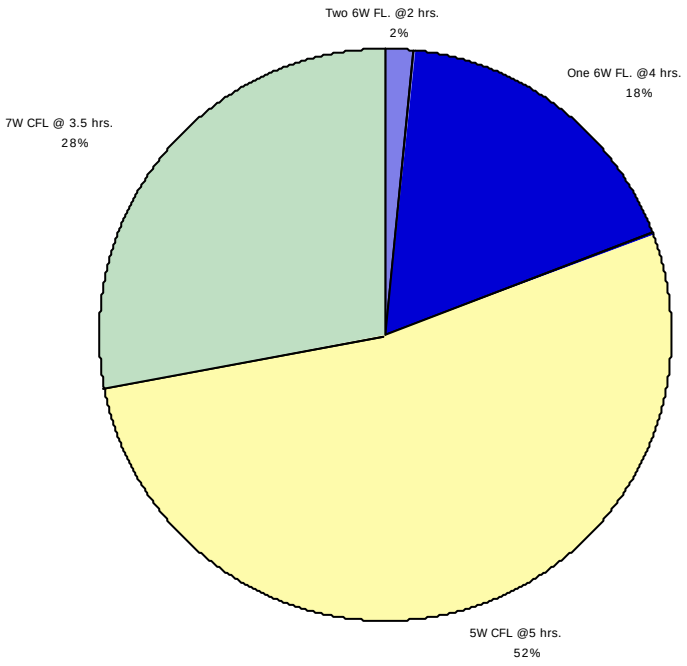
Light output	% 1st choice	% 2nd choice	% 3rd choice	% 4th choice
Two FL. tubes at 6W each	24	**30.4**	21.7	4.3
One FL. tube, 6W	2.2	13	**32.6**	34.8
7W CFL	**50**	21.7	17.4	0
5W CFL	8.7	17.4	13	**43.5**

From the table, the 7W CFL emerges as the favorite light output for the majority of participants from the up-country focus groups. This view is corroborated by the Nairobi session where 12 of the respondents thought the

7W CFL produced the best light. The remaining 2 members of the Nairobi focus group thought the output of the two 6W tubes was better.

People were then asked to decide how many hours of light they preferred, assuming that the battery size was the same for all lanterns (i.e. a lower power lamp would have a longer duration. The following pie-chart shows how the focus group members voted during the trade-off between the quality of light and the duration of output if the lights were being operated on a constant battery bank. Figures for the duration of light output were assumed 2 hours, 4 hours, 5 hours and 3.5 hours for the two 6W fluorescent, one 6W fluorescent, 5W CFL and the 7W CLF respectively.

Figure 1: Trade-off between quality of light and duration



The respondents felt that the duration of the output was more important than the intensity of the light produced since the slight differences in intensity is made up for by the longer duration of light.

4.0 Preferred Product Features

4.1 Preferred Features of "Ideal Lanterns"

In this section, respondents were asked to rank their expectations of a solar lantern according to features. The table below shows the expectations that were ranked highest according to each group and the overall ranking . Presentation is based on the overall vote according to the three groups.

Table 5: Overall lantern preferred feature ranking

Rank	Description of property	Nairobi	Nyeri/Meru	Nakuru	Overall
1	Provision of light for more than 4 hours	0.57	0.76	0.67	**0.70**
2	Lower cost than kerosene and pressure lamps	0.57	0.7	0.67	**0.66**
3	Easily repaired	0.5	0.64	0.75	**0.63**
4	Lights whole room	0.5	0.64	0.67	**0.61**
5	Has a warranty	0.42	0.67	0.67	**0.61**
6	Better light than kerosene, pressure lamp	0.64	0.56	0.67	**0.60**
7	Easy to charge	0.42	0.82	0.08	**0.57**
8	Lasts 2 years or more	0.57	0.61	0.42	**0.56**
9	Easily maintained	0.5	0.67	0.33	**0.56**
10	Lasts a long time before replacement / major repair	0.5	0.52	0.67	**0.55**
11	Spare parts easily available	0.5	0.55	0.5	**0.53**
12	Provides power source for radio	0.35	0.56	0.5	**0.50**
13	Minimum glare	0.42	0.56	0.42	**0.50**
14	Battery state of charge indicator	0.42	0.52	0.5	**0.49**
15	No smoke and accompanying smell	0.57	0.48	0.33	**0.47**
16	No fire , electric shock risks	0.35	0.61	0.17	**0.45**
17	Portability of lantern	0.29	0.52	0.33	**0.43**
18	Not yellow light	0.14	0.64	0.17	**0.42**
19	Lower cost than existing solar lanterns	0.14	0.56	0.33	**0.41**
20	Safety of panel	0.29	0.56	0.08	**0.39**
21	Length of time left before shut off indicator	0.14	0.55	0.25	**0.39**
22	Provision of light for 2-4 hours	0.29	0.36	0.5	**0.37**
23	Operational simplicity	0.14	0.55	0.17	**0.37**
24	Does not break easily	0.35	0.39	0.25	**0.35**
25	Secure from theft	0.14	0.48	0.17	**0.33**
26	AC chargeable	0.29	0.45	0.08	**0.33**
27	Adjustable light level (high / low)	0.29	0.33	0.25	**0.30**
28	Looks like a kerosene	0	0.18	0	**0.10**

NB. The Nyeri and Meru groups have been combined for reasons earlier stated.

4.2 Feature Ranking of Demonstration Units

The respondents voted on the best design features of each of the six lanterns. Included in Table 6 are the features which attracted maximum priority. The priority together with the number of people that chose each lantern are presented in percentages.

Table 6: Overall ranking of demo lantern design features

Rank	Feature	Seo-Solar	Soltech	Solite	Solux	Kyocera 2	Priority
1	Screen geometry	6	8	21	8	58	**61**
2	Screen material	10	10	23	6	50	**59**
3	Handle	10	10	38	8	35	**58**
4	Portability	9	30	6	38	17	**49**
5	Top	8	8	38	8	42	**46**
6	Cable length	9	54	3	14	20	**44**
7	Solar charging port	11	9	27	18	34	**44**
8	Radio jack	n / a	n / a	n / a	32	68	**41**
9	Robustness	6	10	19	48	17	**41**
10	Base	10	8	30	10	42	**39**
11	Switch	12	14	26	21	26	**36**
12	Weight	7	31	7	21	40	**31**
13	Artistry	16	9	20	18	36	**20**
14	Color	19	0	36	28	19	**19**

Kyocera 1 was not included in the above table due to its basic similarity with Kyocera 2. Only 2 of the lanterns, Solux and Kyocera 2 had radio jacks.
As can be seen from table 6, the features that drew maximum priority were screen geometry and screen material. Both features have a direct impact on the intensity of light emitted by the lanterns.

4.3 Focus Group Preferred Lantern

Based on the information and knowledge so far acquired on the lanterns, the respondents then voted on which lanterns was their favorite. This was based on knowledge of features, light quality and duration. The total percentage votes are presented as below.

Table 7: Choices of the favorite lanterns

Index	Seo-Solar	Soltech	Kyocera 1	Solite	Solux	Kyocera 2
Favorite	7	3	3	27	12	53
2nd best	8	13	13	25	12	27

4.4 Focus Group Comments on Lanterns

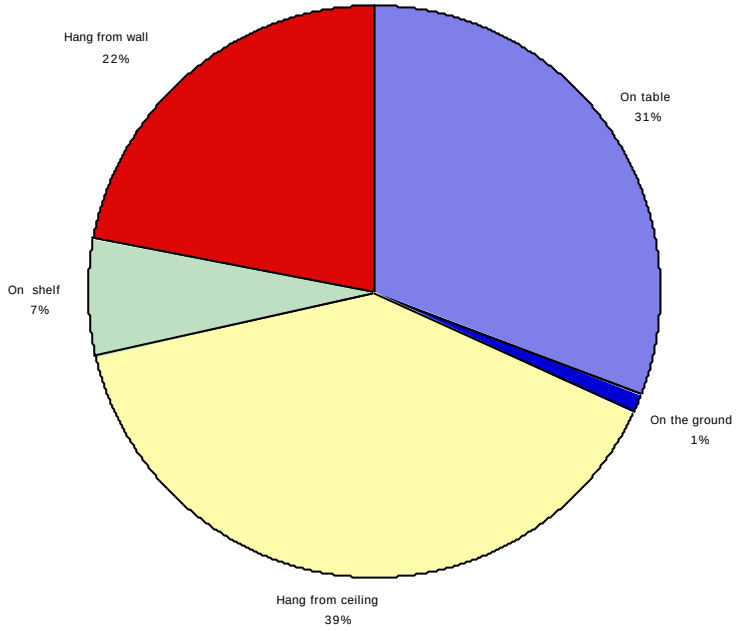
Table 8 gives the pros and cons of each lantern thus clarifying further reasons why respondents voted for these lanterns.

Table 8: Pros and cons of each lantern type.

Lantern	Pros	Cons
Kyocera 2	• AC mains charger available • Adjustable light level / one or two tubes as necessary. • radio connection • good light spread / all directions. • very transparent screen • firm, stable base. • light weight, portable. Just the right weight. • beautiful panel • handle can be hang from ceiling (out of reach of kids)	• not robust • unattractive color. • fragile screen material • cannot operate a large stereo • operation of radio and light likely to kill battery
Solite	• comfortable handle. • nice artistry and color. • fuse easily accessible. • stable, solid base. • tough screen • good light spread	• heavy. • no radio jack. • hazy screen • large charging port, can be tempered with by children.
Solux	• radio connection • clear screen. • very robust and appears water proof. • strong, light flexible handle • attractive color. • very portable.	• poor finish, components visible. • directional light. • too small. • charging port poorly positioned. • directional light
Soltech	• light weight and portable. • economical, can only use one light at a time. • can be hang conveniently from the wall. • firm, strong handle.	• panel too small. • only one light can be used at a time. • directional screen geometry • no radio connection.
Seo-Solar	• extra outlet • nice color • appears robust • stylish, handle offers protection for screen. • Portable.	• fragile handle • shape not pleasing. • heavy. • screen too small, portable.

All the respondents felt that the lantern should be portable with the preferred weight averaging 2.1 Kg. As can be seen from Figure 3, end-users were evenly divided in their preferred positioning of the lantern.

Figure 2: Desired lantern position during use.



4.5 User interface

Other lantern features like the night light, low voltage disconnect, charge indicator and warning light were introduced to the focus groups. Below is a table showing how they voted on the importance of these features.

Table 9: Ranking of user interface features.

Rank	Feature	Very useful %	Useful %	Not useful %
1	Charge indicator	67	24	2
2	Warning light	50	30	2
2	Low voltage disconnect	48	28	13
4	Night light	43	33	13

This is based on the percentage of the respondents that chose each feature as 'very useful'. The figures do not include the Nairobi respondents.

The respondents were concerned about the cost implications of incorporation of these features. As long as the additional costs are not substantial , the 'extras' would be welcome.

5.0 Cost issues

In this section participants were asked to quote what they expected to be the prices of the lanterns used in the focus group meetings. The estimated market prices of the lanterns were then revealed to the groups and later varied in stages of Kshs 300 with the intention of seeing how the price variations would affect respondents' decision to purchase lanterns.

5.1 Highest and lowest lantern prices.

The interviewees gave the following answers as to what they expected would be the highest and lowest prices for all the lanterns.

Table 10: The cost expectations of the entire focus group (except dealers).

Average lantern costs (Ksh)	Seo-solar	Soltech	Kyocera 1	Solite	Solux	Kyocera 2
Nairobi high	4,380	3,530	4,000	4,210	2,380	5,660
Nairobi low	2,450	2,330	2,770	2,750	1,695	3,645
Nyeri/Meru high	4,560	3,100	4,095	4,175	4,125	5,735
Nyeri/Meru low	3,180	2,125	3,095	3,070	2,750	3,990
Nakuru high	1,760	1,450	1,885	2,165	1,400	2,333
Nakuru low	1,270	990	1,233	900	900	1,575

These have been presented according to the three classes earlier mentioned. Prices are in Kenya Shillings (Kshs 100 = 1£)

From the prices suggested by the respondents, it can be seen that rural group (Nakuru) have unrealistically low price expectations for products. Note the similarities in price expectation between the Nairobi and Nyeri/Meru groups —– both of these are aware of PV products, and some of the Nyeri/Meru groups had purchased systems.

5.2 Dealer prices

Dealers were excluded from the surveys because it was felt their presence during the sessions would influence the opinions of other participants. As a result only the Nairobi focus group included three dealers. At this meeting, they were only allowed to present their arguments at the end of each session.

Their opinions generally did not differ greatly from those of the other participants and are have been included in the voting figures in this report.

The price estimation for each of the lanterns according to the Nairobi dealers are as shown in the table below. Dealers also felt that these were the prices at which the lanterns could effectively be sold if they had them in their stores.

Table 11: Lantern price expectations of dealers.

Lantern Prices (Ksh)	Seo-solar	Soltech	Kyocera 1	Solite	Solux	Kyocera 2
Lowest	4,700	1,500	2,330	3,000	2,330	3,830
Highest	7,500	2,600	4,170	4,000	4,000	6,330

Prices in Kenya Shillings

It should be noted here that the Kyocera 1 is now being sold in 2 stores through EAA after the ESMAP project (we used the recovered funds from the project to purchase the favorite lantern). The set price, which is incorporates duties, shipping, storage costs, a 20% retail mark-up and VAT, is close to Kshs 10,000 (ex factory wholesale price is US$ 69, or Kshs 4100). Very few units were being sold, and those that were going were for NGOs, who are willing to pay the premium price. When the price was brought down to Kshs 8,500, the sales rate did not increase.

5.3 Price sensitivity

The present estimated retail prices for the lanterns were given as follows. These prices are estimated based on mark-ups from volume sales and current duty and VAT regimes:

- Seo-Solar Kshs 8,960,
- Soltech Kshs 3,450,
- Kyocera 1 Kshs 6,000
- Solite Kshs 8,060
- Solux Kshs 10,750
- Kyocera 2 Kshs 6,620.

Respondents first voted for the lanterns they would buy at the above prices. Then prices were varied upwards and downwards in stages of Kshs 300 to see how their decision to purchase was affected by the price variations. Tables 12 through to 14 presents the result of the Nairobi, Nyeri and Meru and Nakuru groups respectively. Note that many of the participants (particularly from the low-income Nakuru group) decided that they would not buy lanterns at all at the listed prices.

Table 12: Price sensitivity for the Nairobi group.

Cost (Ksh)	Kyocera 2 %	Seo-Solar %	Solite %	Soltech %	None %
Given price	**36**	21	14	14	14
Up 300/=	**36**	14	14	14	21
Up 600/=	29	0	7	14	**50**
Up 900/=	14	0	7	14	**64**

Down 300/=	**36**	21	14	14	14
Down 600/=	**36**	29	14	14	7
Down 900/=	**50**	29	14	7	0

Table 13: Price sensitivity for the Nyeri and Meru groups.

Cost	Seo-solar %	Soltech %	Kyocera 1 %	Solite %	Solux %	Kyocera 2 %	None %
Given price	6	12	3	6	3	**61**	9
Up 600	6	0	0	6	0	27	**61**
Up 900	6	9	0	6	0	18	**61**
Down 300	6	12	0	6	0	**67**	9
Down 600	6	12	3	12	0	**67**	0
Down 900	6	15	0	18	0	**61**	0

Table 14: Price sensitivity for the Nakuru group.

Cost	Seo-solar	Soltech	Kyocera 1	Solite	Kyocera 2	None
Given cost	0	0	0	0	0	**100**
Down 900	0	0	0	0	0	**100**
Down 1,000	0	33	0	0	17	**50**
Down 1,500	8	17*	8	**25**	**25**	17

* The cost of the Soltech was not lowered at this vote, it remained at the given cost less Kshs 1,000.

5.4 Spares

The easy availability of spares was of particular importance, especially to the rural based groups. The spares also have to be fairly priced otherwise any failed component would render the lantern worthless.

The groups were asked if they had prior to the day of the focus group meeting come across some of the components used in the lanterns. Those who had seen these components gave an estimate of their prices. The results for this section are presented separately due to the large differences that existed in the responses registered by the three classes of interviewees.

Table 15: Component prices as given by respondents of Nairobi group.

Component	Seen %	Average consumer price (Kshs)
CFL	21	580
6W fluorescent tube	43	140
Sealed battery	28	2,250

Size D Nicads	21	475

8 respondents felt that the lantern should offer them a length of service of between 3 and 5 years. 4 of them stated that they would expect a minimum of 5 years service from the lantern.

Table 16: Component prices as given by respondents of Nyeri/Meru groups

Component	Seen	Average consumer price (Kshs)
CFL	52	270
6W fluorescent tube	82	120
Sealed battery	33	1,600
Size D Nicads	18	200
Panel 6-10Wp	79	9,035

NB: This group was largely SHS customers, and hence was familiar with the products.

This groups thought the average life of the bulb used with the lantern ought to be 1.5 years. 3.6 years was the stated life of the battery. 6.4 years was the average expected lantern service life.

Table 17: Component prices as given by respondents of the Nakuru group.

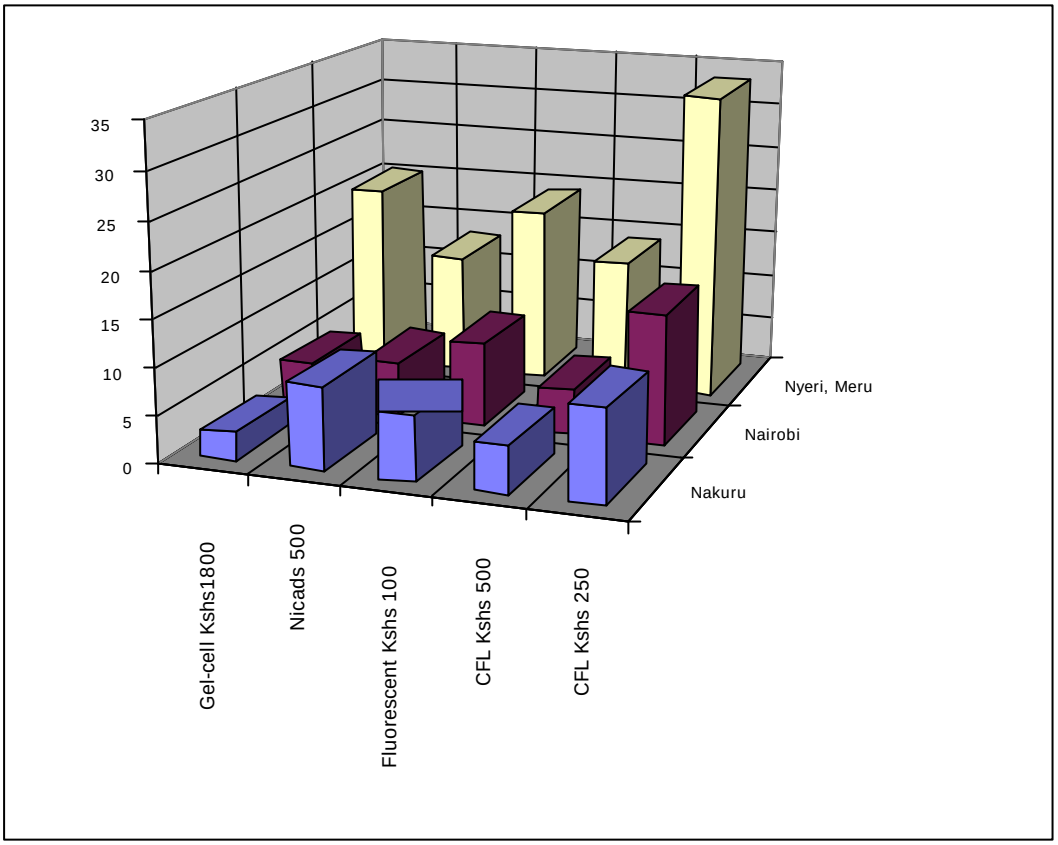
Component	Seen	Average consumer price (Kshs)
CFL	8	600
6W fluorescent tube	67	100
Sealed battery	17	1,250
Size D Nicads	17	250
Panel 6-10Wp	33	2,500

The Nakuru group expected 3.5 years service from the bulb and 5 years from the battery. Lantern expected service life was an average of 8 years.

5.5 Cost of spares

In this section, the respondents were given the actual present market prices of CFLs (Kshs 500), sealed gel batteries (Kshs 1,800) and fluorescent tubes (Kshs 100 per piece). They then voted for the components they would like to have in their lanterns.

Figure 4: Component preference with prices.



Note the difference in preference for CFLs when the price is brought down to Kshs 250 and all its superior features were demonstrated and explained.

5.6 Warranty

The first 2 groups (Nairobi, Nyeri, Meru) agreed unanimously that a warranty of 6-12 months would suffice. This is indeed the prevailing length of warranties for electrical goods in the market in Kenya.

Respondents in the Nakuru focus group stated that they would not purchase lantern units if the warranty did not last 12 months. They also felt that the warranty once in place must be respected by the stores participating in lantern sales.

6.0 Last vote on lanterns.

During each focus group session, the groups voted three times on the lanterns they would prefer to purchase.

1. The first vote was conducted after they had been introduced to the lantern features, but *before* they knew the price.
2. the second when market prices were revealed; and
3. the final time at the end of the session after they had had a chance to learn about lantern performance, spares, etc.

Table 17: Lantern votes according to the Nairobi group.

Vote	Seo-solar	Soltech	Kyocera 1	Solite	Solux	Kyocera 2	none
1st	0	14	0	14	7	64	0
2nd	21	14	0	14	0	36	14
3rd	14	0	0	29	7	50	14

Table 18: Lantern votes according to the Nyeri and Meru groups.

Vote	Seo-solar	Soltech	Kyocera 1	Solite	Solux	Kyocera 2	none
1st	9	0	0	27	6	51	0
2nd	6	12	3	6	3	61	9
3rd	0	15	0	0	0	58	27

Table 19: Lantern votes according to the Nakuru group.

Vote	Seo-solar	Soltech	Kyocera 1	Solite	Solux	Kyocera 2	none
1st	0	0	17	33	8	42	0
2nd	0	0	0	0	0	0	100
3rd	8	0	8	32	8	42	0*

* With the Nakuru group, the participants may mistakenly have been led to say which lantern they would have bought if they could afford it, thus none chose no lantern.

The last vote in all the three cases were held after the 'real' prices had been made known and discussed. These votes were held in addition to the questions to establish the sincerity of the respondents.