# SOKONI ONE-SOMBETINI
# Community Energy Initiatives

## A Final JIP Report submitted by the JIP Team

## Section One:
## Background Information

### I. PROJECT DESCRIPTION

### A. Project title, names of project leaders and team members

Project Title: Community Energy Initiatives

Project Leaders: Dr. Stuart Graham, University of California, Berkeley SYLFF fellow
Mr. Stephen Mutinda Mutiso, University of Nairobi SYLFF fellow

Other team members: Ms. Anna Oursler, UC Berkeley and WODSTA
Mr. Amanuleus Kibona, WODSTA
Ms. Adelasia Divona, Universidad de Duesto SYLFF fellow
Dr. Garrick Blalock, Cornell University
Dr. Claudia Radel, Princeton University SYLFF fellow

### B. Activities, including the role of each team member

During 2007-2008, the JIPTeam implemented a "joint social action project" in accordance with the following outline:

> "Energy resources are increasingly scarce in Tanzania. This project addresses human problems that stem from that scarcity, which affect rural women and their families and intends to provide energy options to people. The project team has organized a 'Community Energy Resource Center' in Sombetini, (Tanzania), consisting of a central building where women, girls and families gather in a communal setting to learn about energy-sustaining technologies. The project team is using various methodologies, including several different approaches, consisting of disseminating information, public demonstrations, group discussions, open office hours,

and workshops and training for local people and these approaches will lead to participatory involvement and capacity building.

The JIP team designed a project—by creating a local Community Energy Center (hereinafter Center)—which allows women and female children to learn about energy-saving technologies, to construct stoves and appliances for their own domestic use, and to test various alternative fuels that can substitute for firewood or charcoal in the home. Some of the technologies being promoted at this Center include passive solar food dryers and cookers, bio-fuel (plant oil) candles and lamps, fuel-less insulated cooking baskets, energy efficient stoves with water heaters, and biogas. Also, alternative types of fuels will be processed and distributed at the Center, including various types of recycled briquettes made from charcoal dust, sawdust, corn and coffee husk, fuel from plant oil, reused kerosene, and the sun!

The Center was operated in partnership with a local non-profit organization, the Women Development for Science and Technology Association (WODSTA -- see www.wodsta.org). Heading the WODSTA participation were Amanuleus Kibona and Anna Oursler, who worked on the ground with WODSTA as community development officers, helping establish the Center and carry out its activities in a sustainable manner. During the initial phase of the project, (during the first 3 months), WODSTA organized efforts so that the local community could attend public demonstrations of different energy-saving technologies, and ran a series of workshops to train local women in building efficient stoves (which are now being sold at the Center by local women to earn income to support the Center beyond the JIP duration). These locally-trained women are gaining respect in the community, along with the skills needed to spread knowledge in using stove technology. Discussion sessions were also implemented in local schools regarding the relation between energy and gender / culture, as well as the distribution of technologies and educating in the larger community.

Activities at the Center were implemented by the local community “Steering Committee” and WODSTA, under the direct supervision of team members Oursler and Kibona.

Project leader Mutiso conducted periodic visits to the Sombetini site to work with WODSTA, community leaders, and to monitor activities. Project leaders Graham and Mutiso conducted project evaluation, oversight, and reporting. Blalock, Divona, and Radel provided ideas.

## II. PROJECT GOALS AND OBJECTIVES WITH MEASURED OUTCOMES

### A. Proposed Project Goals (JIP Application, October 2006)

1) Build a 'Community Energy Resource Center' (Center) in Arusha, Tanzania
2) Increase Public awareness of alternative-energy technologies; increase to at least 40% the share of local residents with basic energy knowledge (currently 12% --WODSTA/CDTI survey 2005) using public demonstrations, literature, and outreach.
3) Increase the use of energy saving appliances; distribute 300 energy-saving stoves and 5,000 briquette pieces in Arumeru. Stoves will be built by locals and available at affordable prices at the Center. Workshops will teach skills in building/maintaining appliances.
4) Decrease the percentage of household budget spent on energy resources. By teaching the cost-benefits to locals, we expect adopting households to reduce spending on fuel to below the 20-30 current share shown in prior surveys.
5) Increase networking opportunities and communication among local residents interested in energy saving technologies. Demonstrate that at least ten new visitors attended Center activities each month.
6) Increase the income-earning and leadership skills of local women. Train six local women to produce and sell appliances, and to conduct workshops and serve as in-house energy experts for other local residents.
7) Increase collaboration between local governments and communities on improving energy policies. Facilitate civic and government involvement in energy issues. Invite government officials to visit and interact with staff and local residents.
8) Increase environmental preservation. Increasing use of energy-saving technologies decreases regional consumption of non-renewable fuels (e.g., firewood).
9) Increase awareness of gender equality among locals. Consistent with cultural norms, hold five community meetings focusing on gender sensitivity and energy-related decision making in the home.

## B. Successful progress in meeting proposed goals: Project end, April 2008

| | GOAL | ACHIEVED? | DEMONSTRATED ACHIEVEMENTS IN MEETING GOAL | CORRESPONDING EVIDENCE & DATA |
|---|---|---|---|---|
| 1 | Build a 'Community Energy Resource Center' in Arusha, Tanzania | Yes | Inception of a central building space with daily open office hours | Section: 1a<br>Pp. 8 below |
| 2 | Increase Public awareness of alternative-energy technologies to at least 40% the share of local residents with basic energy knowledge. | Yes | Increased environmental awareness in poor local residents<br><br>Heightened the understanding of energy-saving technologies in the local community | Section: 3a<br>Pp. 15 below |
| 3 | Increase the use of energy saving appliances; distribute 300 energy-saving stoves and 5,000 briquette pieces in Arumeru | No | Increased use of energy saving appliances.<br><br>Facilitated community-wide technology demonstrations, trainings and appliance construction seminars | Section: 2 a & b<br>Pp. 12 below |
| 4 | Decrease the percentage of household budget spent on energy resources. By teaching the cost-benefits to locals, we expect adopting households to reduce spending on fuel to below the 20-30 current share shown in prior surveys. | Yes | Reduced the percentage of locals' household budgets spent on energy resources<br><br>Reduced the number of hours spent by girls collecting fuel | Section: 5 a<br>Pp. 18 below |
| 5 | Increase networking opportunities and communication among local residents interested in energy saving technologies. Demonstrate that at least ten new visitors attended Center activities each month. | Yes | Increased networking opportunities and communication among local residents interested in energy saving technologies | Section: 1 b<br>Pp. 10 below |

| GOAL | | ACHIEVED? | DEMONSTRATED ACHIEVEMENTS IN MEETING GOAL | CORRESPONDING EVIDENCE & DATA |
|---|---|---|---|---|
| 6 | Increase the income-earning and leadership skills of local women. Train six local women to produce and sell appliances, and to conduct workshops and serve as in-house energy experts for other local residents | Yes | Boosted income-earning opportunities for local women | Section: 5 b<br>Pp. 20 below |
| 7 | Increase collaboration between local governments and communities on improving energy policies. Facilitate civic and government involvement in energy issues. Invite government officials to visit and interact with staff and local residents. | Yes | Improved communication and between government offices and local communities concerning energy related issues. | Section: 1 b<br>Pp. 10 below |
| 8 | Increase environmental preservation. Increasing use of energy-saving technologies decreases regional consumption of non-renewable fuels (e.g., firewood). | Yes | Improve environmental preservation through a decrease in the use of non-renewable fuels | Section: 4 a<br>Pp. 17 below |
| 9 | Increase awareness of gender equality among locals. Consistent with cultural norms, hold five community meetings focusing on gender sensitivity and energy-related decision making in the home. | Yes | Increased gender equality in targeted communities by raising awareness and increasing the number of women & girls involved in **energy-related** | Section: 6 a<br>Pp. 22 below |

## C. The Evidence: Demonstrated Achievement in Accomplishing Project Goals

Overall, the JIP team was very successful in achieving the goals it set out in October 2006. Below we summarize the evidence of the project's success. Following [on the indicated pages] is an explanation of such evidence.

**1. Build a 'Community Energy Resource Center' (Center) in Arusha, Tanzania.**

a. Inception of a central building space with open office hours
b. Increased networking opportunities and communication among local residents interested in energy saving technologies; Improved communication and between government offices and local communities concerning energy related issues.

**2. Encourage the adoption of sustainable-energy technologies by local people**.

a. Facilitated community-wide technology demonstrations, trainings and appliance construction seminars
b. Increased the use of energy saving appliances

**3. Raise environmental awareness in poor local residents.**

Heightened the understanding of energy-saving technologies in the local community

**4. Lessen environmental degradation.**

Improved environmental preservation through a decrease in the use of non renewable fuel

**5. Decrease poverty through targeted social entrepreneurship.**

a. Reduced the percentage of locals' household budgets spent on energy resources & lessen the number of hours spent by girls collecting fuel
b. Boost income-earning opportunities for women

**6. Increase gender equality in targeted communities**.

Increase the number of women and girls involved in energy-related activities

## III. SUMMARY OF MAJOR ACHIEVEMENTS & CHALLENGES

### Achievements

- Increased technology awareness: Technologies awareness is significantly growing in the local community; even though many residents do not have enough disposable income to purchase these technologies. We found that with technologies above the cost of two US dollars, customers often needed assistance – either through a loan, payment plan or subsidy – to afford the product. In light of these significant economic challenges, we see the topic of alternative energy has been successfully integrated into the community. A large success.

- Community sense of "ownership:" The volunteer Energy Committee and larger women's energy group has taken tremendous ownership of the Energy Center. There massive community participation and motivation within every activity, and over time the community has shown to initiative trainings, workshop, demonstrations and outreach on their own accord.

- Highly motivated core team: The local confidence and knowledge level within the 11 women leaders of the Energy Center has increased tremendously. Before project inception, these women were simply residents of the village, and now they are regarded and respected as region wide experts in the area of Appropriate Technology, alternative energies and fuels.

### Challenges

- Future financial support; in order to continue building a strong and sustainable business, the Center will require further investments, or a business loan, that can help them to expand their sales and marketing outreach, while increasing the scale of production to meet the demands of these larger markets.

- Low household income levels; the average village household has very little disposable income. Many families live on *less than 2.50$ per day* and have trouble meeting their basic food and shelter needs. Thus the profit margin of any business in this environment is very thin, and the technology goods that sell well tend to be small and inexpensive. These market conditions make is difficult to promote larger technologies such as biogas and solar systems.

- Lack of business acumen; increased skill in market outreach and marketing strategies is needed. Many people in the community are aware of the technologies, but are skeptical of the new technology effectiveness in comparison with traditional cooking techniques. Because household income is so low, these households are not willing to use their limited funds to try new products. Successful operations require increased consumer education and promotional product outreach.

## IV. ANNEXES & SUPPORTING DOCUMENTATION OF PROJECT PROGRESS

A. Updated Project Activity Timeline (April 2008)

B. Business Plan Review Seminar & Monitoring visit Agenda – April 2008

C. Efficacy Study Outline & Sample survey questionnaire – Dec/Jan 2008

D. Effectiveness survey findings and analysis - January 2008

F. Copy of letter requesting CBO status to the District Commissioners Office; CBO status is currently pending due to review of the application. Application was submitted in April 2008

G. Project Budget Overview and Detailed Expenditures (2007 – 2008)

H. Brochure of fuels and stoves

I. Group Constitution, signed

J. CD Rom with Project Photos

K. Proof of Tokyo Foundation Funds Transfer, and Zero Balance

# Section Two:

## Demonstrated achievements of "Activities and Outputs" Listed under the Work-plan in the Project Document

### 1. a. Inception of a central building space with open office hours where women, girls and families gather in a communal setting to learn about energy-sustaining technologies

**Status of Center Edifice:** During the first project quarter a baseline survey was conducted, the community was mobilized and elected a volunteer energy committee, and the Sokoni One Community Energy Center was officially opened (annex a photo of the launch?). The second and third quarters saw extensive training coupled by hands-on practice in technology construction and use by the volunteer energy committee who serves as the board of the Energy Center. Each committee member now serves as an in-house expert regarding one type of energy saving appliance or alternative fuel. The third quarter also held a strong focus on building the group business skills and ensuring that all Center appliances and fuels generated a profit which could sustain ably run the

Center beyond the project funding duration. This included business trainings, creating a Center business plans, and introducing the process of cost-benefit-analysis.

The Center activities during the second and fourth quarters also emphasized outreach to the larger community and building a larger knowledge base of the use and availability of appropriate technologies. This included conducting two market studies, and extensive student participation in community outreach. Students visited community members door-to-door on three different occasions collecting feedback on technology use, and inviting members of the larger community to attend Center activities, seminars and training workshops. The in-house issue area experts conducted community trainings where they would educate or teach the neighborhood residents how to construct their various appliances.

The fourth quarter has focused on production and sale of technologies, raising the question of division of labor and profit, stable supply of resources, and transport of materials for appliance construction. The group has also gone on to author an official group constitution, register with the Tanzanian Office of Registrar as a cooperative in the Arusha Region, and open a bank account where all profits are kept. In order to transparently manage these developments, the group has elected a chairwoman, secretary, and treasurer for their Energy Committee – and they have hired two Center attendants who are employed by the group and who staff the Center edifice each day. The Center attendants write a monthly report on all Center activities, sales, inquiries, and developments in order to have an active log of Center activities. A copy of these reports is kept on file at the Center as well as the WODSTA office.

**Main Stakeholders:** The main stakeholders of the project include the community members involved in the energy group, the elected leaders of the Center named the 'Energy Committee', the customers who purchase stoves and fuels, organizations who give financial and technical support to the Center (such as WODSTA, KAKUTE, PRETT), and the municipal community development officers who are responsible for ensuring development in urban wards.

**Equipment available at Center: Evidence**

| EQUIPMENT AVAILABLE AT CENTER | QUANTITY |
|---|---|
| Biogas tank; Uses cow manure and potential jatropha seed cake in the future. | One $2m^3$ tank |
| Biogas stove | One, one-plate |
| Cement stove with water heater | One |
| Mud-brick stoves. Two-plates | Two |
| Solar fruit and vegetable produce dryers | One |
| Fuel-less cooking baskets (large & medium) | Five |
| Plant oil candles | 85 – 100 |
| Solar PV system: 28 watts including charge controller, 12v deep cell battery, wiring, cell phone chargers DC, 2 lights, and panel frame | One system |
| Solar water heater: for the purpose of making hot water without using any fuel. Hot water is useful for all residents for washing clothing, dishes, households, showering and tea. | One system, 300 liters |
| Plant oil stove and plant oil hand press: for purpose of pressing oil from plant seeds to be used in cooking or lighting. | One demonstration stove, One hand press |
| Cupboards and shelving units for storage of technologies and fuels | various |

**1. b. Increased networking opportunities, enhanced learning and communication among local residents, government agencies, and community groups interested in energy saving technologies.**

**Demonstrate that at least ten new visitors attended Center activities each month.**

The project has striven to work together with existing community groups, energy related efforts and local governments in all steps of implementation. Each of the 9 technology based trainings has been conducted in partnership with a technology area expert or organization. This knowledge sharing has created direct links between the Sokoni One Energy Center community leaders and various regional technology experts. These links give the group credibility within the larger community, provide a working grassroots example for technology partners to showcase in their dissemination, and they build confidence of the Energy Center group members. Even at it's early stages, the group has received noted recognition by municipal authorities in the environment and community development sectors as well as local village and ward leaders. The project

also will host a site visit by TROICARE, who will bring 16 Kenyan community leaders from 8 NGOs to study and learn from the Energy Center experiences.

**Number of People who have visited to date: Evidence**

- 291 officially registered visitors since November 2007.
- Estimated 700 total guests to visit the Center since July inception.

These guests visit the Center to either purchase technologies and fuels, learn about the Center activities, or attend one of the scheduled construction or demonstration workshops to learn about the alternative technologies and fuels.

**Trainings and Activities that increased energy-related networking: Evidence**

| Activity | Partner/Network enabled |
|---|---|
| Hand Pressed Briket Training | East African Briketing Network |
| Improved Stove (Jiko Janja) Construction Training | German Teknische Zuzamenarbieten (GTZ) and Promotion of Renewable Energies, Tanzania |
| Nane Nane Demonstration | Tanzanian Agriculture Society (TASO) |
| Sombetini Village Annual Public Meeting | Village Leadership Committee |
| Solar PV Installation Training | PRET Solar Installation (Fundi) Network |
| Group Dynamic and Regional Network Building Workshop | *SIDO;* Small Industrial Development Organization |
| Tree seedling nursery and Oil processing | *KAKUTE* Limited |

**Site Visits to other organizations, institutions and projects: Evidence**

| Group Name | Description | Location |
|---|---|---|
| UMANGU | Women's group business trained by WODSTA and KAKUTE on production and sale of dried fruits and vegetables, jatropha soap, and traditional medicines. | Kikatiti, Usa River |
| Environmental Enterprize Development Initiative | Youth membership group which sponsors a radio station, semstress activities and briket production. | Ngarenero, Arusha |
| Residence of Mama Sumari | WODSTA member and progressive farmer who promotes permaculture and appropriate technology systems through daily use and demonstration. | Tengeru, Arusha |

## 2. a. Facilitate community-wide technology demonstrations, trainings and appliance-construction seminars.

**Public Outreach and Community Awareness Activities: Evidence**

| EVENT | DESCRIPTION & HIGHLIGHTS | DATE | ATTENDING |
|---|---|---|---|
| Community-Wide Baseline survey presentation | Volunteer Energy Committee elected. This group continued to serve as the board for the Center to date. | | 81 |
| Gender-Energy Discussions in local schools and community | Held at local secondary schools regarding issues of Gender equality, decision making, and energy use. Educated students and teachers. Raised awareness around the issue of gender equality in decision making. | Nov 28 and Nov 29 2008 | 103 students 4 community members |
| Demonstrations during village meeting | Demonstration and member meeting during general village convention; November 18 2007 – Increased the sales of the Center significantly. It also helped to spread awareness of the Center's skills and activities at a regional level. The Center chairperson was approached to have a membership meeting with the technologies on display so the leaders could learn about the Center activities. | Nov 18 '07 | 76 residents and village leaders |
| Efficacy Household Survey measuring Energy and Time Savings of Technologies | The project sampled users of improved stoves and fuels in order to measure the reduction or change in fuel consumption. For three days we measured the amount of fuel wood consumed and inquire into change in health status of the cooks and their small children. These household samples will then be compared to the original baseline survey as well as five control houses using traditional three stove fires. | Dec 15 '07 until Jan. 28 '08 | 50 Households 25 Improved stove users 25 alternative fuel users |
| Health Related Impacts of Energy Use Focus Groups Discussions | Mama Vera Ngowi worked together with WODSTA and the Partnership for Clean Indoor Air in creating a syllabus to educate local mothers regarding the harmful health impacts of cooking with biomass and toxic fuels indoors. The seminar was very informative with members of the local government in attendance, brochures and health posters distributed, and awareness raised of the Center activities in the community | Dec 15 '07 | 26 |

**Community Workshops and Training Seminars Conducted:**

| | |
|---|---|
| 1. Solar Drying; Fruit & Vegetable Processing & Preservation Workshop | Feb-08 |
| 2. Bio Fuels; Plant oil used for cooking and lighting (Phase I; Oil Pressing) | Mar-08 |
| 3. Bio Fuels; Construction of bio fuel lamps and stoves (Phase II) | Apr-08 |
| 4. Solar Water Heater Construction Workshop | May-08 |
| 5. Compact mud and brick stoves | Mar-07 |
| 6. Cement-brick multi-plate stoves | Nov-07 |
| 7. Briket Press Machine Construction (Phase I) | Sep-07 |
| 8. Biomass Waste Briket Production (Phase II) | Oct-07 |
| 9. Cement Stove with Water Heater Construction | Aug-07 |
| 10. Fuel less cooking basket construction | Jun-07 |
| 11. Biogas tank construction and system use workshop | Dec-07 |

**2.b. Increase the use of energy saving appliances; distribute 300 energy-saving stoves and 5,000 briquette pieces in Arusha.**

**Stoves will be built by locals and available at affordable prices at the Center.**

**Workshops will teach skills in building/maintaining appliances.**

While we made some progress in this project outcome during 2007-2008, we did not fully meet the desired goal. However, the Center will continue to work toward fulfilling the project goal over the following year. The team found that educating community members regarding the benefits of appropriate technologies was a process that required substantial time commitments, and residents wanted assurance of the technologies' success before adopting the method (i.e., before they purchased and used). The main factors contributing to our failure to meet the target were the low income and poor economy of the immediate community, and a lack of established market for the technologies. Nevertheless, the Center has disseminated 55 energy saving stoves and appliances and 3,668 briquettes in the target ward.

Our achieved technology dissemination is the result of a combination of subsidized sales as a part of a workshop or training construction seminar, and full sales of appliances constructed by the group members and sold in the community after they have gained construction skills at the workshops. Throughout the project implementation, inflation in the community leveled at .5%, while the average household

income remained stable. This lessened the ability of residents to purchase technologies and fuels, while raising the cost of the construction materials being used. The project now realizes that these objectives were overambitious given the economic nature of the ward. One solution is to partner with micro-credit agencies so that households can achieve loans which will help them to purchase the more expensive technologies. These technologies often require an immediate high input cost while the savings is appreciated long term.

**Increased Stove and Technology Use: Evidence**

Number of different types of Technologies disseminated

| | |
|---|---|
| Stoves: | Jiko Janja (5) |
| | Jiko la cement (2) |
| | Jiko la bura (2) |
| | Jiko la mkaa (12) |
| | Jiko la biogas (1) |
| | Fuel-less cooking basket/Wonder Basket (32) |
| Fuels: | Briquettes from charcoal dust (3,268) |
| | Briquettes from sawdust (400) |
| | Plant oil (2 liters) |
| | Sawdust (90 kilos) |
| Appliances: | Solar dryer (one two shelf dryer) |
| | PV system (one 28 watt panel) |
| | Biogas (one 3m cubed tank system) |

**Community Voices:** Effectiveness and frequency of improved stoves and fuels:

*I use charcoal briquettes three times per week, only in the morning. I cook makande, rice, and beans. If it is not raining I will cook outside using the sawdust briquettes. But when it rains, like now, I must use kerosene indoors.*
*– Ramla Mallay*

*I use the jiko janja improved stove each day, 7 times for one week, two times per day. 3 times per day on Saturday and Sunday. When I put a sawdust briquette inside, it lights fast, faster than the three stones stove. If you light it you do not wait to cook. And you do not need to blow on it.*

*In the rainy season people really need these briquettes. Because there is so much rain, the cars that bring firewood and charcoal from the mountains do not come. And it is expensive. People like these briquettes a lot. – Judica Lembris*

## 3.a. Heighten the understanding and use of energy-saving technologies in the local community.

**Increase public awareness of alternative-energy technologies to 40% from the current 12% awareness base (WODSTA/CDTI baseline survey, 2005).**

The JIP project aimed to increase awareness of energy saving technologies and fuels in the local community of Sokoni One and Sombetini. The project succeeded in raising the baseline awareness by executing 9 public demonstrations, distributing almost 1,000 informational pamphlets and brochures, holding 12 workshops and seminars on the construction of energy saving technologies and gender norms, and launching a public space where women and community members can visit to purchase or simply learn about energy saving technologies.

We conducted a follow-on survey to determine the differences in attitudes and outcomes when compared to the baseline survey conducted at the beginning of the JIP project. The results to the questions aimed at measuring community awareness of energy alternatives show that over the course of project implementation *the percentage of community members aware of Center activities and technologies increased substantially.*

| Survey Title | Method | Date | Number of Respondents | % Respondents Aware of Energy Saving Technologies | % Respondents Interested In Energy Saving Technologies |
|---|---|---|---|---|---|
| Project Baseline Survey | Survey/Questionnaire | March 2006 | 108 | 11% | 94% |
| Market Study | Shop Interviews Household Questionnaires | September 2007 | 100 HH 56 Businesses | 68% | 91% |
| Efficacy Study | Questionnaire & repeated visits to measure technologies | December '07 & January 2008 | 50 HH 9 Government Leaders 10 Community Development Workers | 98% . | NA |

## **Community Voices:** Awareness is Rising in the Community

*The group ourselves, we understand the best of all the community what alternative energy means. People outside, we still must explain to them what a briket is and how to use it. When they learn what these energies do then they say its good and they want to use them. But people will say the technologies are expensive, until they learn the bigger savings – for example health or environment. But we, all the women in the group know how these alternative energies are! Other people still need to study them in order to see the benefits. -Hilda Shayo*

*I see that until we go to the people and explain to them what is alternative energy and how it works, the large community will not know. We go to their houses. For example,when we think of the jiko janja improved stove, so many people rent houses. They can not build this stove in the rented house because the house owner is not them. If they move, they can not take the stove also. People like it but are afraid to build it. It has benefits. From the people that know, others are asking about the cost. If they understand the cost they want the technology, but not until they have money. Each person has an opinion of alternative energy though.*
*- Ednesta Malawa*

*People that I do not relate with are now starting to understand about these fuels. Not like the beginning. The reason is because we ourselves [group] are starting to cook with them, and others see us and they want to do the same. The ones who don't trust us they still want to understand. They all want to know how much the briket costs and they want to join the group. Because they see that our news these days has become very good.*

*Just two days ago – we were drying vegetables outside of the centre. And they passed on the street yelling 'what are you doing?' It is the development of sokoni one these days. They want to be a part. We still wait for people to really understand the meaning of alternative energy. They are just beginning to see it. – Jamila Munyalo*

*Twenty percent of the people in this ward have arrived at visiting the centre to today. Thirty percent of the people in the ward know of what we are doing but have not been to the energy centre. Women communicate with the issue of energy and cooking, so women know more about our centre. We need to write letters to the men to invite them.*
*- Anna Mjema*

## **Heightened Understanding and Awareness: Evidence**

(a) Number of Visitors:
700 estimated visitors
(b) Number of brochures distributed:
960 brochures of various types distributed in the community
(c) Trainings and Seminars held outside the Center edifice:
9 trainings held in the community
3 seminars held in the community

## 4.a. Improve environmental preservation through increased use of energy saving technologies and a subsequent decreased regional consumption of non renewable fuels. (e.g., firewood)

Despite its small scale, the project has made significant progress in reducing the use of firewood and charcoal locally, as well as using waste materials to produce briquettes – which cleans up the local environment. The energy saving technologies promoted also reduce the amount of fuel needed to cook equal quantities of food conserving vast amounts of fuel wood over a long period of time. An Efficacy Survey conducted in January 2008 measured the amount of reduction in fire wood and time that was achieved by the energy saving appliances. This measurement was taken in 25 different households, and repeated three times over to ensure accurate data.

The survey also collected opinion data on whether the stove users and general community members believed that the use of alternative technologies and fuels contributed to environmental conservation.

**Community Voices:** Contribution of Center towards environmental Conservation

*Lets say we are with brikets, the brikets of charcoal. After we go out and collect the dust of the charcoal from the streets and the charcoal stands, we bring it back to the centre and we continue to mix it and make brikets. Then the environment is looked after because making brikets improves the streets in the community and also instead of taking firewood these houses use brikets. Then less amount of trees are cut nearby. And also the waste papers, instead of throwing them out, people bring them here and we collect them from the street and schools. Then the street is cleaner.. - Neema Mtui*

*In the preservation of the environment, also the dirt of the charcoal helps. Instead of throwing the charcoal dust/dirt on the road, we go to pick it and then the environment is cleaner. We also collect waste papers that if we do not collect people just waste them on the ground. It dirties the environment. - Anna Mjema*

**Improved Environmental Preservation: Evidence**

(a). Number of kilos of waste collected to make briquettes
598 Kilos of Charcoal dust used for briquettes per month
36 kilos of waste papers collect for briquettes each month

(b). Number of kilos of firewood saved by using improved stoves =
72 kilos per month

(c). Number of kilos of traditional fuels that are being replaced by briket use.
Average number of kilos of firewood replaced by briket use =
1,203.32 kilos per month
Average number of kilos of charcoal replaced by briket use =
430 kilos per month

**5.a. Reduced the percentage of locals' household budgets spent on energy resources & lessen the number of hours spent by women and girls collecting non-renewable fuel.**

**By advertising the cost-benefits of improved technologies, we expect use of technologies to reduce spending on fuel to below the 20-30 amount shown in the baseline survey.**

The briquettes promoted through the JIP project contribute a significant immediate savings to the daily household income. Because each briquette piece has equal heat value to *at least 1.5 pieces of firewood*, the household fuel budget can be substantially reduced. The stoves and larger appliances require a more long-term economic savings horizon due to high upfront costs. Because each stove reduced the amount of firewood needed daily, the immediate savings is a few hundred shillings per day. The improved stove users also benefit by reducing the amount of time needed to cook food by an average of 22 minutes per day.

**Community Voices:** Do you save money or time by using these alternative technologies?

*"I have a 'jiko janja' improved stove, and if I am with the firewood that has already dried, I used perhaps one quarter of the amount of firewood than with a three stone fire. It reduces the amount of time that I must cook. With that stove, to put on Makande [bean-maize dish] I use minutes of 2 hours. It a three stone fire you put it on the fire for three hours."*
*- Anna Mjema*

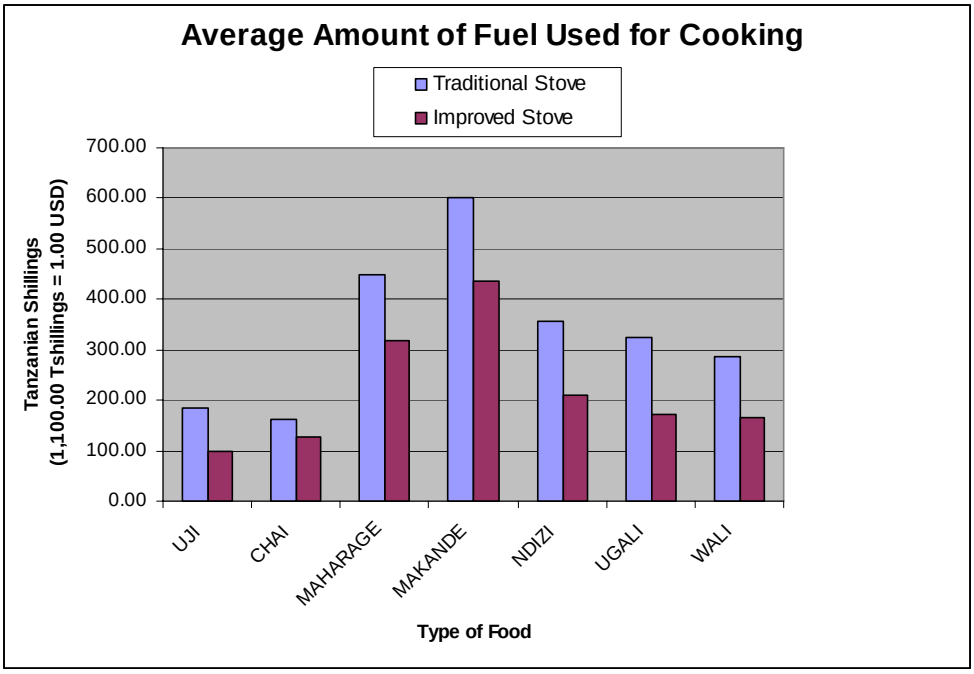
**Community Voices:** Do you save money or time by using these alternative technologies?

*"If I use the charcoal briquettes it increases the time to cook, but the benefit comes because the briquettes don't use much money. It is much cheaper than charcoal for my family. So if I have time, I do not need as much money."*
*- Ednesta Malawa*

*"I use the briquette for my business to fry fish and bananas each night and then I sell them. I bring 2000 fishes and two branches of bananas each day. I cook all of my fish and bananas with one piece of sawdust briket and sometimes there is still something left.*
*It has reduced a lot of money. With firewood I used 1,000 T-shillings each night for my business. Now with the briquettes I use 500 T-shillings each night. And often it remains until cooking chai for my children the morning after." - Jamila Athumani*

## Household Budget Reduction: Evidence

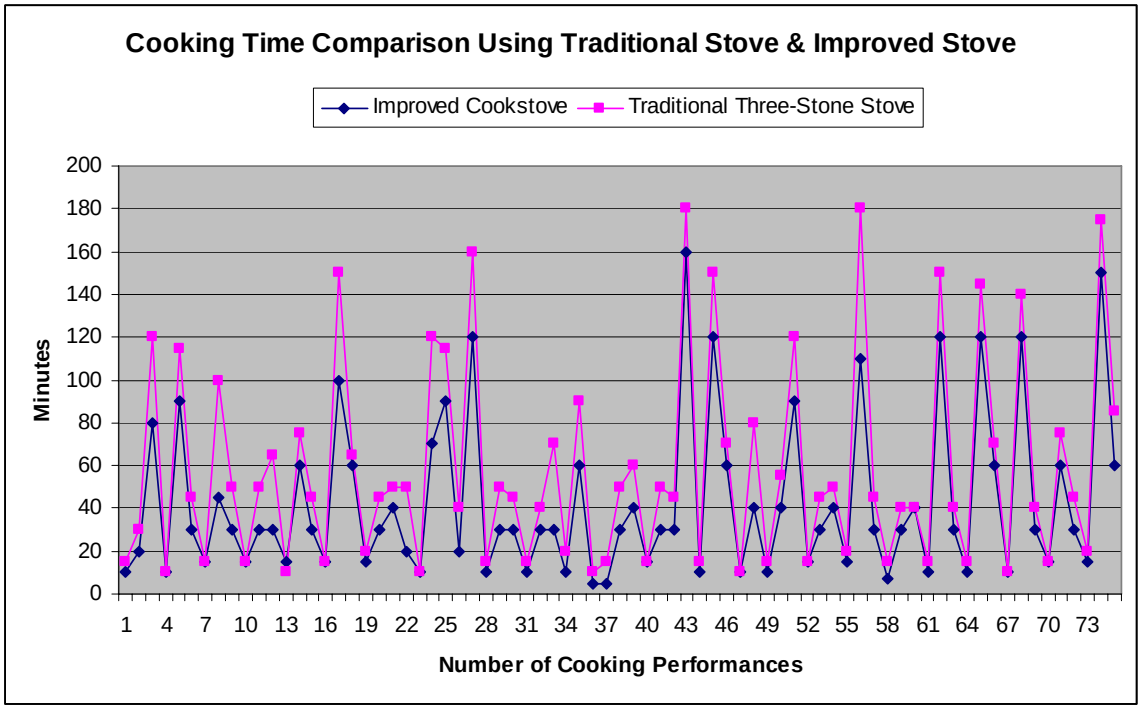
(a). Calculated savings from Dec-Jan. 2008 Kitchen Performance Test




*Average savings per day using energy savings stove =*
*274.94 Tanzanian Shillings*
*Percent Reduction between 21% - 47% depending on the type of food cooked*
*Median percent reduction = 33%*

## Workload and Time Reduction: Evidence

Calculated savings from Jan. 2008 Efficacy survey (KPA Cooking-time savings chart)




*Average amount of time saved using energy saving stoves =*
*22.28 minutes per day per house*

*Proximity of the Center to households, compared to locations used to collect fuel previously:*
*Savings of 1.3 – 1.5 kilometers walked to collect fuel per day per person.*

**5.b. Boosting income-earning opportunities for women by involving them in the production and sale of energy-saving technologies. Increase leadership skills of local women.**

**Training six local women to produce and sell appliances, conduct workshops and serve as in-house energy experts for other local residents.**

The JIP project has exceeded this goal by training 11 local women as in-house energy experts in the wards of Sokoni one and Sombetini. These women contribute and guide group activities as well as conduct energy related business in their capacity. The project has employed two local women at the Center with rotating employment of each of the

committee members on an as needed basis. In addition each committee member has a skill area of stove or fuel construction. When a community member needs a stove built the women will go to the house and build it. The women technicians will get a percent of the stove cost, the Center gets a percent, and the materials used to build the stove are paid for through the customer fees.

Also each time the project has a workshop or event at the Center, members of the standing committee recruit 4-12 local residents to help with cooking, loading and unloading, organization, and drinks. In addition, the project strove to purchase all materials/supplies used at the Center in nearby shops or from local artisans. Such local purchase helps to build the local economy and involves other residents and business persons in the Center activities.

Because the first eight months of the project focused on the technology training component, the sales and income generation of stove production have only just started, in March 2008. It is our opinion that these opportunities and earnings will increase markedly as the project moves on.

**Income generating opportunities: Working toward the self-sufficiency of the Center, and the women building and selling the technologies**

A major part of the JIP project was to increase the income-earning opportunities of local women, by giving them skills in building the various energy-saving technologies, and also skills in understanding how to run a small enterprise the business of which was to sell these technologies to local residents. We are satisfied in the training of the members of the local steering committee, coupled with the growing self-sufficiency of the Center.

**6.a. Increase the number of women and girls involved in energy-related decisions in the community.**

**Increase awareness of gender equality among locals.**

**Holding five community meetings focusing on gender sensitivity & energy-related decision making in the home.**

There is anecdotal evidence that women have been empowered in using their voices and confidence for consultation with men on energy-related issues in the community and the home. We have reports that women have convinced and advised their husbands to start using energy efficient stoves to save and minimize the household budget. For instance, Judica Lembris was able to bring information to her husband about energy-saving alternatives, and together they agreed to build a bio gas plant as an alternative source of energy.

These initiatives have contributed and strengthened women and girls to participate in decision-making organizations. The involvement and participation of women in the community energy committee is one of the pieces of evidence suggesting that changes have occurred, whereby women are able decide crucial issues related to energy. In turn, the entire community benefits. Husbands have not prevented women from attending the regular weekly meetings—a reality which would not have been possible prior to the founding of the Center.

Moreover, we conducted a “gender and energy” discussion series in the secondary schools, in which girls and boys realized that they both have equal potential as far as in terms of decision making, division of labor, performance and resources ownership.

The Energy Committee itself has developed considerably in its capacity to organize a small business that produces technologies and fuels. The group has recently completed the application to register as a Community-Based Organization (CBO), authored a constitution, and written a business plan. These steps are seen as significant progress in leadership development among the female members of the community.

**Community Voices:** Has the involvement of women within the Energy Center changed the way that decisions are made and women are considered within your community or your household?

*…In a family and these things, usually, the wife does not have a choice. Usually, the decider is the husband. But families are also different. There are those where the wife and husband agree what to do together. Maybe the wife wants to use briquettes and she tells the husband and he agrees. But in other families, the husband is the decider. Most families in Tanzania are this.*
*- Neema Mtui*

*In our culture for women to be the head of household is difficult. The men are the ones who own the house and the woman helps the man to keep the house. To me this is a difficult change, for the woman to be the head of household. I think activities like the kituo cha nishati help people to see that women also have knowledge. That we can be experts in things when in the past this was only something a man decided on. Because it is the women in this centre who are learning to build and install technologies – now the men must come to the women and ask advice. This is a change that gives women height [authority]. It makes them stronger in the household.*
*- Rukia Pendeza*

**Number of women and girls involved in Center activities that address energy-related decisions and cultural norms: Evidence**

(a). Women and girls attending discussion sessions
58 in girl children in local secondary school
35 women participating in community-wide discussion

(b). Number of women on the volunteer Energy Committee
11 women as members of the energy committee

(c). Number of women in the community-wide Energy Group
73 women members

(d). Number of women involved in hands on trainings & workshops: (78 people)
Health impacts of indoor smoke Seminar (24)
Jiko Janja improved stove Construction workshop (12)
Brick and mud stove construction training (8)
Cement Stove Construction Training (4)
Solar dryer construction training (3)
Bio fuels Education Seminar (8)
Briquette Machine Construction Workshop (2)
Briquette Production workshop (14)
Briquette market analysis and follow up seminar (3)

## APPENDIX A: Activity Timeline: JIP Community Energy Initiatives Project

| Activity Description | Months (March 2007 – February 2008) | | | | | | | | | | | | Notes/Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | A | M | J | J | A | S | O | N | D | J | F | |
| Baseline (Technology Assessment) Survey | | | | | | | | | | | | | Published by CDTI in Community Energy Study |
| Community Mobilization, including WODSTA members, to discuss logistics and interested community leaders interested in helping with the JIP Resource Center | | | | | | | | | | | | | Mr. Kibona, ECommittee This is ongoing and will Continue beyond the JIP funding duration |
| Complete inception report including updated timeline, action plan, and itemized budget | | | | | | | | | | | | | Dr. Graham, Mr. Mutiso, Ms. Oursler, |
| Funds received from JIP | | | | | | | | | | | | | April 15 2007 |
| Meeting to finalize work plan and timeline for opening and outreach of the Resource Center | | | | | | | | | | | | | This ended up being a Series of meetings; both Weekly EC mtgs and Mtgs with Manyanga as The centre director. |
| Inception plan monitoring and Establishment visit. | | | | | | | | | | | | | Steven Mutiso 21/4/07 |
| Site Visit to pre-existing urban WODSTA Centers | | | | | | | | | | | | | Visit to Mama Sumari as A site study. Weekend Which Mutisa visits Arsh. |
| Prepare for purchase of required fuel and appropriate stoves identified by the baseline survey | | | | | | | | | | | | | Still need to purchase PV Panel, biogas tank, solar Water heater, briket Press (jatropha, dust) |
| Publication and printing of all Literature to be used at the Center During the first three months | | | | | | | | | | | | | Have started printing Flyers for distribution at Events. Construction Manuals are printed as Workshops occur. |
| Construction of Community Bio Gas Tank at Center and outreach/ education in community on collecting animal (cow) dung for fuel | | | | | | | | | | | | | Professional Energy Advisor, Energy Trainers, Mr. Kibona, Ms. Oursler |
| Gathering to prepare for Center's opening: outreach plan, assembly of infrastructure, and mobilizing participants | | | | | | | | | | | | | Centre Launch was Attended by over 500 Residents and took place On June 23, 2007 |
| Purchase of office supplies to be used at the Center | | | | | | | | | | | | | We need to establish a Business plan and then Identify someone to staff The centre before buying Supplies. |
| Hold general meetings in community to discuss timeline and logistics of Center | | | | | | | | | | | | | Energy Committee, Mr. Kibona, Community Ward officials |
| Hold training for local women on conducting demonstrations of energy saving stoves (6 women): Thursday 21st, and on sat 16th they will lstudy | | | | | | | | | | | | | June 19th 2007; trained Energy committee on all Technologies and fuels. Also reviewed how to Answer public questions. |

## Activity Timeline: JIP Community Energy Initiatives Project – Final Report

| Activity Description | Months (March 2007 – February 2008) | | | | | | | | | | | | Notes/Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | A | M | J | J | A | S | O | N | D | J | F | |
| Purchase previously prepared list of appropriate stoves and fuel required for Center activities: | | | | | | | | | | | | | Energy Committee, Ms. Oursler, Mr. Kibona, Center Staff |
| Purchase utensils to be used at the Center | | | | | | | | | | | | | Until now we have simply Been using WODSTA's Utensils. |
| Community mobilization: invite community to events & demonstrations at the Center | | | | | | | | | | | | | This is an ongoing event |
| Purchase food stuffs/supplies for demonstrations | | | | | | | | | | | | | This is not as important As we thought as usually The mamas just bring it From home. |
| Grand Opening of Center: Conduct practical demonstrations showing Sustainable Energy Uses for the Community | | | | | | | | | | | | | June 23rd 2007 |
| Conduct practical workshop to make "wonder basket" stoves (~10 participants in each workshop) June 22nd 2007 AND August 28th 2007 | | | | | | | | | | | | | Trained leaders from the EC are leading the Second workshop. |
| Community discussion: Address issues of ger women's rights (~10 participants) | | | | | | | | | | | | | First one in schools And second one held at The centre. |
| Conduct practical workshop to build energy ef Earth stoves | | | | | | | | | | | | | Trainer on Energy Saving appliances |
| Monitoring and Evaluation Visit 2 | | | | | | | | | | | | | September 15 2007 |
| Community demonstration of Briquettes/sawd public (~40 participants): | | | | | | | | | | | | | Trainer on Energy |
| Community Participation in NaneNane activities | | | | | | | | | | | | | Three EC members came Each day to construct Stoves (aug 1-10) |
| TOT training of cement stove and water heater | | | | | | | | | | | | | August 9th and 10th Nanenane fairgrounds |
| Fuel less cooking basket sewing session II; TOT | | | | | | | | | | | | | Instructed by the TOT's Chosen from the EC. A 28 |
| Part II - Energy Saving Compact Earth-brick-cement Stove Training. | | | | | | | | | | | | | To train TOT's from the EC. |
| TOT Training on cement stove with water heater construction workshop | | | | | | | | | | | | | The three teachers will Hold a training in the ward To teach the rest of the EC |
| Energy Committee Business Training | | | | | | | | | | | | | This will be combined with The site visit number 2 |
| Hands on workshop to construct domestic passive solar stoves | | | | | | | | | | | | | I would like to change this To water heaters. |
| Community discussion: Address issues of ger use/decisions (~10 participants): | | | | | | | | | | | | | In schools and at the centre |

Activity Timeline: JIP Community Energy Initiatives Project – Final Report

| Activity Description | Months (March 2007 – February 2008) | | | | | | | | | | | | Notes/Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M | A | M | J | J | A | S | O | N | D | J | F | |
| Monitoring and Evaluation Visit three. | | | | | | | | | | | | | To be determined |
| Practical workshop to build energy efficient st bio fuels (~10 participants): | | | | | | | | | | | | | We will build lamps and We will also introduce a Bio fuel stove. |
| Community Demonstration of food processing and preservation, open to public (~40 people) | | | | | | | | | | | | | Trainer on Solar Technologies, Assistant Trainer, Mr. Kibona |
| Practical workshop to build domestic & community solar food dryers | | | | | | | | | | | | | Trainer, Solar Energy, Assistant Trainer |
| Constructing and selling of the appliances at Center | | | | | | | | | | | | | Center Staff, Energy Committee |
| Staff trained, and available, to give energy advice to drop-in visitors | | | | | | | | | | | | | Center Staff, Energy Committee |
| Reporting (quarterly) | | | | | | | | | | | | | It seems as if the first report Was submitted semi-annly. |
| Final project evaluation | | | | | | | | | | | | | WODSTA, Mr. Mutiso, |
| | | | | | | | | | | | | | |

| KEY: | Completed | To Be Completed | Ongoing Activity |
|---|---|---|---|
| | | | |

## APPENDIX C: Community Energy Focal Point Monitoring Plan

**MONITORING PLAN for WODSTA Community Energy Initiative Project**

**Purpose** of WODSTA monitoring plan is to demonstrate fuel savings & time efficiencies of stove technologies. This will help the project implementers to improve our marketing impacts and generate stove efficiency data for donor satisfaction.

**Specific Objectives:**

* determine the fuel reductions and time savings of improved stoves

* assess the general user satisfaction of technologies

* estimate the reduction in environmental impact of stove use

**Study Design**: Before and After, Kitchen Performance test; a paired sample study of households who have gone from using traditional technologies to improved technologies with no controls

* 25 houses using improved cook stoves
* 100 households sampled in April 2007 will serve as 'before' sample group
  Cross check with a small sample of cross section households (2%)
* 5 control houses using traditional three stove fires

**Total Sample Size**: 25HH (IS) + 5 HH (TS) + 5 HH safety = 35

**Under a 95% confidence rate and a CoV of .40, with a detectable difference in means of 30% we will sample 25 households (11 more than statistically necessary) who have gone from using traditional wood stoves to improved wood stoves.**

**Study Parameters:** The study will consist of three steps.

* Day 1: Interview to review process with head of household, collect general information, and leave the data sheet with household.
* Day 2 & 3: Complete data sheet while cooking with regular household habits. Household will be visited once by students to resolve any insecurities.
* Day 4: Follow up visit to collect the energy use data sheets, review and discuss them, as well as ask a series of subjective questions to supplement the data (regarding air quality/health, user satisfaction, and general effectiveness of the community energy focal point centres).

## DAY 1 - PERSONAL INFORMATION

**ORGANIZATIONAL INFORMATION**

Name_____ Ward: _____ Street: _____

Sex: Male ( ) Female ( ) Age_____

Education: Primary ( ) Secondary ( ) University ( ) Other ( )

1. When did you begin using your improved cook stove? _____

2. Do you use other varieties of stoves at other times of the year/season? Yes ( ) No ( )

Which kinds and why: _____

**FUEL & TIME SAVINGS**

**DAY 2 – QUANTATIVE MEASUREMENTS (Two days of measurements)**:

| **Date** | **Time** | **What food did you cook?** | **What stove did you use to cook the food?** | **How long did it take the food to cook?** | **How much fuel did you use to cook the food? how will this be measured?** | **How much money does this amount of fuel cost?** |
|---|---|---|---|---|---|---|
| *24/11/2007* | *Saa nane mchana* | *maharage* | *Jiko la cement* | *Masaa 4* | *Bura ya 300* | *300/=* |
| | | | | | | |

## DAY 3 – SUBJECTIVE INFORMATION

### FUEL & TIME SAVINGS

1. In your opinion, is the amount of fuel used by the improved cook stove a reduction from the amount of fuel used by your traditional cook stove?
Yes ( ) No ( )

2. In your opinion, is the amount of time used to cook on the improved cook stove a reduction from the amount of time used to cook on a traditional cook stove?

Yes ( ) No ( ) Why? _____

3. How much time do you spent collecting or going to purchase energy sources each day?
_____

4. Has this amount of time changed since using the improved stove? Yes ( ) No ( )
How/Why?_____

### USER SATISFACTION

5. Have you noticed any breathing problems in you or any of your family members who spend time cooking? Yes ( ) No ( )

6. Do you experience any problems using the improved stove? Yes ( ) No ( )
Describe: _____

7. Do you prefer using these alternative technologies or do you prefer using traditional technologies?
_____

### INCREASED SALES

8. Do other community members benefiting from these alternative energies?
Yes ( ) No ( ) If Yes, How? _____
_____

9. In your opinion, is there any need for conserving fuels? Yes ( ) No ( )
Why/Why not? _____

10. Do you think the establishment of energy centers in this area will help to deal with the problem of energy? Yes ( ) No ( )

| | Name of Household or Interviewee | Street-Division Name | Ward | Date of Follow up Survey | how long have they been using technology? | FOOD COOKED USING IMPROVED TECHNOLOGY | | | | | | FOOD COOKED USING TRADITIONAL TECHNOLOGY (Data from baseline surveys 2006) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | TYPE OF FOOD | AMOUNT OF TIME (MINUTES) | TYPE OF FUEL | AMOUNT OF FUEL (NUMBER OF PIECES) ** | AMOUNT OFMONEY (TSHILLINGS) | Date of Baseline Survey | TYPE OF FOOD | AMOUNT OF TIME (MINUTES) | TYPE OF FUEL | AMOUNT OF FUEL (NUMBER OF PIECES) ** | AMOUNT OFMONEY (TSHILLINGS) |
| **1** | mary lucas | kanisa road | kijenga | December-07 | one month | UJI | 10 | fire wood | 1 | 100.00 | Apr-07 | UJI | 15 | fire wood | 1.5 | 150.00 |
| | B | | | December-07 | | UGALI | 20 | fire wood | 1 | 150.00 | May-07 | UGALI | 30 | fire wood | 3 | 450.00 |
| | C | | | December-07 | | MAHARAGE | 80 | fire wood | 3 | 300.00 | May-07 | MAHARAGE | 120 | fire wood | 4 | 400.00 |
| **2** | Lilian Bruno | kikokwaroa | lemara | December-07 | 2m onths | CHAI | 10 | fire wood | 2 | 100.00 | Apr-07 | CHAI | 10 | fire wood | 2 | 150.00 |
| | B | | | December-07 | | MAKANDE | 90 | fire wood | 1.5 | 150.00 | Apr-07 | MAKANDE | 115 | fire wood | 3 | 300.00 |
| | C | | | December-07 | | NDIZI | 30 | fire wood | 2 | 250.00 | Apr-07 | NDIZI | 45 | kuni | 4 | 550.00 |
| **3** | Lusia Lucas | Lolovoni | Sokoni one | December-07 | 3 months | CHAI | 15 | fire wood | 2 | 100.00 | Apr-07 | CHAI | 15 | fire wood | 3 | 200.00 |
| | B | | | December-07 | | MAHARAGE | 45 | kuni | 4 | 400.00 | Apr-07 | MAHARAGE | 100 | kuni | 4 | 400.00 |
| | C | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 50 | kuni | 2 | 200.00 |
| **4** | Neema Godwin | nanenane | nanenane | December-07 | 3months | CHAI | 15 | kuni | 1 | 100.00 | Apr-07 | CHAI | 15 | kuni | 1 | 100.00 |
| | B | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 50 | kuni | 3 | 300.00 |
| | C | | | December-07 | | MAHARAGE | 30 | kuni | 3 | 300.00 | Apr-07 | MAHARAGE | 65 | kuni | 3.5 | 400.00 |
| **5** | Salome Manyanga | kanisani | sombetini | December-07 | 3 months | CHAI | 15 | firewood | 2 | 100.00 | Apr-07 | CHAI | 10 | firewood | 3 | 150.00 |
| | B | | | December-07 | | NDIZI | 60 | firewood | 4 | 200.00 | Apr-07 | NDIZI | 75 | firewood | 4 | 200.00 |
| | C | | | December-07 | | UGALI | 30 | firewood | 4 | 200.00 | Apr-07 | UGALI | 45 | firewood | 4.5 | 250.00 |
| **6** | Mama agnes | Sombetinin A | sombetini | December-07 | 1 month | CHAI | 15 | firewood | 2 | 100.00 | Apr-07 | CHAI | 15 | firewood | 3 | 150.00 |
| | B | | | December-07 | | MAHARAGE | 100 | firewood | 4 | 200.00 | Apr-07 | MAHARAGE | 150 | firewood | 5 | 250.00 |
| | C | | | December-07 | | WALI | 60 | firewood | 2 | 100.00 | May-07 | WALI | 65 | firewood | 3 | 150.00 |
| **7** | mama john | madukani | sokoni one | December-07 | 2months | CHAI | 15 | kuni | 2 | 200.00 | May-07 | CHAI | 20 | firewood | 1 | 150.00 |
| | B | | | December-07 | | UGALI | 30 | briketi | 3 | 120.00 | May-07 | UGALI | 45 | firewood | 5 | 150.00 |
| | C | | | December-07 | | WALI | 40 | briketi | 4 | 160.00 | Apr-07 | WALI | 50 | firewood | 4.5 | 150.00 |
| **8** | Anjela Mushi | lolovuno | sokoni one | Janaury 2008 | 1 month | UGALI | 20 | briketi | 3 | 120.00 | Apr-07 | UGALI | 50 | firewood | 5 | 200.00 |
| | B | | | Janaury 2008 | | CHAI | 10 | kuni | 6 | 600.00 | Apr-07 | CHAI | 10 | firewood | 6.5 | 700.00 |
| | C | | | Janaury 2008 | | MAHARAGE | 70 | briketi | 4 | 160.00 | Apr-07 | MAHARAGE | 120 | firewood | 6 | 250.00 |
| **9** | Josehine Likuni | ndaliboi | daraja 2 | December-07 | 6 months | MAHARAGE | 90 | kuni | 4 | 400.00 | Apr-07 | MAHARAGE | 115 | kuni | 5 | 550.00 |
| | B | | | December-07 | | WALI | 20 | kuni | 2 | 200.00 | Apr-07 | WALI | 40 | kuni | 2 | 200.00 |
| | C | | | December-07 | | MAHARAGE | 120 | kuni | 6 | 600.00 | Apr-07 | MAHARAGE | 160 | firewood | 8 | 850.00 |
| **10** | Mama Pere | lolovoni | sokoni one | Janaury 2008 | 2month | CHAI | 10 | briketi | 3 | 90.00 | Apr-07 | CHAI | 15 | firewood | 2 | 100.00 |
| | B | | | Janaury 2008 | | UGALI | 30 | kuni | 2 | 100.00 | Apr-07 | UGALI | 50 | firewood | 4 | 200.00 |
| | C | | | Janaury 2008 | | WALI | 30 | briketi | 3 | 90.00 | Apr-07 | WALI | 45 | firewood | 4 | 150.00 |
| **11** | M.Saumu Saluum | Sombetinin A | sombetini | December-07 | 3 months | CHAI | 10 | briketi | 3 | 90.00 | Apr-07 | CHAI | 15 | firewood | 2 | 100.00 |
| | B | | | December-07 | | WALI | 30 | briketi | 4 | 120.00 | Apr-07 | WALI | 40 | firewood | 4 | 150.00 |
| | C | | | December-07 | | NDIZI | 30 | briketi | 4 | 120.00 | Apr-07 | NDIZI | 70 | firewood | 6 | 200.00 |
| **12** | aristides | njiro,nanenane | themi | Janaury 2008 | 3months | CHAI | 10 | kuin | 1 | 50.00 | May-07 | CHAI | 20 | firewood | 1 | 100.00 |
| | B | | | Janaury 2008 | | MAHARAGE | 60 | ku ni | 2 | 200.00 | Apr-07 | MAHARAGE | 90 | firewood | 4 | 400.00 |
| | C | | | Janaury 2008 | | CHAI | 5 | kuni | 1 | 100.00 | May-07 | CHAI | 10 | firewood | 2 | 150.00 |
| **13** | M. Raphael Mushi | lolovoni | Sokoni one | December-07 | 1 month | CHAI | 5 | kuni | 1 | 100.00 | Apr-07 | CHAI | 15 | firewood | 1.5 | 200.00 |
| | B | | | December-07 | | NDIZI | 30 | kuini | 2 | 200.00 | Apr-07 | NDIZI | 50 | firewood | 4 | 400.00 |
| | C | | | December-07 | | MAHARAGE | 40 | kuni | 2 | 200.00 | Apr-07 | MAHARAGE | 60 | firewood | 5 | 500.00 |
| **14** | mahija rajabu | darajani | daraja 2 | December-07 | 3month | CHAI | 15 | kuni | 1 | 100.00 | Apr-07 | CHAI | 15 | firewood | 2 | 200.00 |
| | B | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 50 | firewood | 4 | 400.00 |
| | C | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 45 | firewood | 5 | 500.00 |
| **15** | mama neystory | madukani | sokoni one | December-07 | 4 months | MAKANDE | 160 | kuni | 8 | 600.00 | Apr-07 | MAKANDE | 180 | firewood | 10 | 750.00 |
| | B | | | December-07 | | UJI | 10 | kuni | 1 | 100.00 | Apr-07 | UJI | 15 | firewood | 2 | 200.00 |
| | C | | | December-07 | | MAHARAGE | 120 | firewood | 4 | 200.00 | Apr-07 | MAHARAGE | 150 | firewood | 4.5 | 250.00 |
| **16** | prisca choaji | ndalivoi | daraja 2 | Janaury 2008 | 3month | WALI | 60 | firewood | 4 | 200.00 | Apr-07 | WALI | 70 | firewood | 4 | 200.00 |
| | B | | | Janaury 2008 | | CHAI | 10 | firewood | 3 | 150.00 | Apr-07 | CHAI | 10 | firewood | 2 | 100.00 |
| | C | | | Janaury 2008 | | MAHARAGE | 40 | firewood | 4 | 500.00 | Apr-07 | MAHARAGE | 80 | firewood | 6 | 750.00 |
| **17** | bertha redding | flower | moshono | Janaury 2008 | 18 months | CHAI | 10 | firewood | 2 | 100.00 | Apr-07 | CHAI | 15 | firewood | 2 | 100.00 |
| | B | | | Janaury 2008 | | UGALI | 40 | firewood | 4 | 200.00 | Apr-07 | UGALI | 55 | firewood | 6 | 300.00 |
| | C | | | Janaury 2008 | | NDIZI | 90 | firewood | 8 | 400.00 | Apr-07 | NDIZI | 120 | firewood | 9.5 | 500.00 |
| **18** | mama beni | madukani | sombetini | December-07 | 3 months | CHAI | 15 | kuni | 1 | 100.00 | Apr-07 | CHAI | 15 | firewood | 2 | 200.00 |
| | B | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 45 | firewood | 4 | 400.00 |
| | C | | | December-07 | | WALI | 40 | kuni | 2 | 200.00 | Apr-07 | WALI | 50 | firewood | 3 | 300.00 |
| **19** | Elizabeth Daneil | lemara kati | lemara | December-07 | 2 months | CHAI | 15 | kuni | 1 | 100.00 | Apr-07 | CHAI | 20 | firewood | 2 | 200.00 |
| | B | | | December-07 | | MAKANDE | 110 | kuni | 8 | 800.00 | Apr-07 | MAKANDE | 180 | firewood | 10.5 | 1,000.00 |
| | C | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 45 | firewood | 5 | 500.00 |
| **20** | hoisia | lolovoni | sokoni one | December-07 | 3 months | CHAI | 7 | kuni | 1 | 100.00 | Apr-07 | CHAI | 15 | firewood | 1 | 100.00 |
| | B | | | December-07 | | UGALI | 30 | kuni | 2 | 200.00 | Apr-07 | UGALI | 40 | firewood | 4 | 400.00 |
| | C | | | December-07 | | WALI | 40 | kuni | 2 | 200.00 | Apr-07 | WALI | 40 | firewood | 4 | 400.00 |
| **21** | mama sumari | centre | tengeru | December-07 | 15 months | UJI | 10 | kuni | 1 | 100.00 | May-07 | UJI | 15 | firewood | 2 | 200.00 |
| | B | | | December-07 | | MAHARAGE | 120 | kuni | 6 | 600.00 | May-07 | MAHARAGE | 150 | firewood | 9 | 800.00 |
| | C | | | December-07 | | WALI | 30 | kuni | 2 | 200.00 | May-07 | WALI | 40 | firewood | 4 | 400.00 |
| **22** | judica lembric | ,madukani | sokoni one | Janaury 2008 | 4months | CHAI | 10 | kuni | 2 | 100.00 | May-07 | CHAI | 15 | firewood | 2 | 100.00 |
| | B | | | Janaury 2008 | | MAHARAGE | 120 | kuni | 4 | 200.00 | May-07 | MAHARAGE | 145 | firewood | 5 | 300.00 |
| | C | | | Janaury 2008 | | WALI | 60 | kuni | 2 | 100.00 | May-07 | WALI | 70 | firewood | 4 | 200.00 |
| **23** | Mama Nickson Gida | longidoni | Sokoni one | December-07 | 2 months | CHAI | 10 | kuni | 2 | 100.00 | May-07 | CHAI | 10 | firewood | 2 | 100.00 |
| | B | | | December-07 | | MAKANDE | 120 | briketi | 5 | 200.00 | May-07 | MAKANDE | 140 | firewood | 6.5 | 350.00 |
| | C | | | December-07 | | UGALI | 30 | briketi | 2 | 80.00 | May-07 | UGALI | 40 | firewood | 4 | 150.00 |
| **24** | Lucia Joseph | lolovoni | sokoni | Janaury 2008 | 3months | CHAI | 15 | kuni | 2 | 100.00 | May-07 | CHAI | 15 | firewood | 2 | 100.00 |
| | B | | | Janaury 2008 | | NDIZI | 60 | kuni | 4 | 200.00 | May-07 | NDIZI | 75 | firewood | 7 | 400.00 |
| | C | | | Janaury 2008 | | UGALI | 30 | kuni | 4 | 200.00 | May-07 | UGALI | 45 | firewood | 9 | 450.00 |
| **25** | Jackaline mtui | katikati | daraja mbili | Janaury 2008 | 6 months | CHAI | 15 | kuni | 2 | 100.00 | May-07 | CHAI | 20 | firewood | 2 | 100.00 |
| | B | | | Janaury 2008 | | MAHARAGE | 150 | kuni | 4 | 200.00 | May-07 | MAHARAGE | 175 | firewood | 6 | 200.00 |
| | C | | | Janaury 2008 | | NDIZI | 60 | kuni | 2 | 100.00 | May-07 | NDIZI | 85 | firewood | 4 | 250.00 |
| **26** | mama joachimu | heli selasi | town | December-07 | traditional stove | | | | | | | NDIZI | 90 | kuni | 6 | 650.00 |
| | B | | | December-07 | | | | | | | | WALI | 55 | kuni | 4 | 400.00 |
| | C | | | December-07 | | | | | | | | UGALI | 60 | kuni | 4.5 | 500.00 |
| **27** | mama mkubwa | fire | themi | December-07 | traditional stove | | | | | | | MAKANDE | 55 | kuni | 8 | 950.00 |
| | B | | | December-07 | | | | | | | | WALI | 65 | kuni | 5 | 400.00 |
| | C | | | December-07 | | | | | | | | CHAI | 20 | firewood | 2 | 150.00 |
| **28** | mama sadai | kaniosani | sombetini | December-07 | traditional stove | | | | | | | CHAI | 15 | kuni | 1 | 100.00 |
| | B | | | December-07 | | | | | | | | UGALI | 55 | Firewood | 4 | 300.00 |
| | C | | | December-07 | | | | | | | | UGALI | 80 | kuni | 5.5 | 500.00 |
| **29** | mahija nibamb | darajani | daraja2 | December-07 | traditional stove | | | | | | | UJI | 20 | kuni | 2 | 200.00 |
| | B | | | December-07 | | | | | | | | WALI | 50 | kuni | 4 | 350.00 |
| | C | | | December-07 | | | | | | | | WALI | 40 | kuni | 3 | 300.00 |
| **30** | Ritha Charles | Longidoni | sokoni one | December-07 | traditional stove | | | | | | | MAHARAGE | 65 | firewood | 7 | 600.00 |
| | B | | | December-07 | | | | | | | | CHAI | 25 | firewood | 2 | 300.00 |
| | C | | | Janaury 2008 | | | | | | | | MAHARAGE | 75 | kuni | 5 | 650.00 |

**** Each piece of firewood weights approximately .80 Kilo**