



NMBM Solar Water Heater Pilot Project

Social Contribution & Change Report on early outcome findings



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Most significant change stories

The following stories were collected during the follow-up survey at Zanemvula in September 2009. Both storytellers were part of the group of enumerators.

THE SUN, THE SAVIOR by Nomfuneko Bungu

I was part of a group of 19 individuals trained as enumerators to conduct a social survey in Zanemvula community, relating to the installation of solar water heaters. I participated in a week training session and I have worked for 3 weeks.

My current involvement is to do a follow up survey. I go to the houses which I am allocated to go. There I absorb information like how person's life has changed and improved, since the installation. What are the things that they are satisfied with, what are the things they are not satisfied with. What they wish it could improve with regards to the Solar Water Heater

One day while I was doing survey I went to this household I met a woman middle aged and I did an interview with her while we were doing our interview she said things which I think resulted in significant change. She liked the new technology and she appreciates what the Nelson Mandela Bay Municipality is doing with regards to assistance to the poor.

She told me that since she is poor, she is eating from hand to the mouth, this new technology has brought a lot of positive things to her especially financial and health wise.

She told me that she lives with her husband who has a chronic condition like pneumonia or cold something of that sort, she had struggle during those times she hadn't got a gyser. She had to light the stove wait for the stove to be okay, put the pot full of water then wait a few minutes for the water to get hot. When the water is hot she would fill a hot water bottle with hot water put that water between her husbands feet. Sometimes it worried her as there were days they do not have fuel for heating that water, but now that she has a solar water heater she's still doing that and it has brought positive results to her husbands health. His cold feet problem is not the same now.

This story has touched my life since I know how it is when you want to do something to help improve a person's conditions but due to the fact that u don't have electricity or paraffin you can't because with all this recession going on globally fuel is up, electricity is up people are unemployed, but with the energy coming from the sun thanks to God and to the scientists.

STORY by Nkayi Andisile

I heard from one of the community structures that people with grade 12 were wanted at the community hall to do surveys for the solar water heater. I went and registered my name, and I was called.

When we did the first survey I think it was different to the follow up survey because at first everyone was excited and looking forward to having their solar water heaters.

They would even go long distances to your home and wait for you if you are not at home so that you can make them "sign" for geyser. Interviewing people was made easy by the fact that most people never had geysers before and other thing that brought a lot of interest to people was that the solar water heater doesn't use electricity. The follow up survey has been a challenge more than anything, most people had different expectations to what they dealt with when they received their solar water heaters. They told us their complaints and their unsatisfactions but importantly they came with some good things to say about the solar water heater.

In all this experience there was a house which I think the solar water heater has made a lot of positive changes. In this household there are 7 people living, 2 parents and 5 children. 3 of them are school goers (still in school) and their father was employed until last month, now unemployed. So in the morning they had to queue to heat their water on the paraffin stove. They also had to wait for each other to use a washbasin, as the result the children sometimes miss their transport to school. But now that they have their solar water heater they don't queue anymore and if someone uses the wash basin the other can use a shower. The solar water heater also helped them save money and paraffin because they don't heat water for bath anymore. The solar water heater also had some indirect positive impacts on the health of some members of the house such as reducing the possibilities of getting flu, probably when the mother does the laundry she doesn't have to use cold water if its cold in winter. Even when sometimes they don't have paraffin they always have heated water.

All in all I think the solar water heater is such a great and important technology for the South African economy if the installers could do away with the minor problems like leakage, the solar water heater is a perfect technology to come against the energy crisis in this country.

Because it happened and people's lives have been improved. I believe there are also some other houses which have some good change stories, other households were even in worse situations but now at least the difference have been made. This story is meaningful to me because people don't see the changes that the solar water heater has done but indirectly there's a lot of changes.

EXECUTIVE SUMMARY

The NMBM Solar Water Heater Pilot Project consists of 1263 houses chosen to receive a solar water heater paid for by the Nelson Mandela Bay Municipality. This report, based on a baseline survey and a follow-up household survey, is intended to inform the project management and contracted solar water heater suppliers about the social contributions made and changes caused by the project.

Main Findings:

The findings are organised according to the six household assets which constitute a household's livelihood resources according to the Sustainable Livelihoods Approach. The findings are the result of a comparison between the baseline and follow-up data from 175 households.

Natural capital:

- Energy poverty has significantly declined through the increased number of electrified houses and the installation of solar water heaters. Wood and paraffin usage has decreased and more people are using electricity for cooking, lighting and the heating of water. Of the 175 households studied, 16% more now heat their homes in winter.
- Fuel and electricity usage for water heating has dropped, which might result in a reduction of greenhouse gas emissions.
- It is unclear whether the overall indoor air quality has improved, due to the fact that an increased number of households are heating their homes and using paraffin for this purpose. The indoor air quality has improved for those households that have changed their fuel usage from wood and/or paraffin to electricity.

Human capital:

- Human capital has been fostered by the employment of 24 people from the community for the duration of the project, for either support with the installations or as enumerators for the survey.

- The health situation has undergone little improvement in the surveyed households. Respiratory illnesses occur less frequently, which many people attribute to the solar water heater intervention. Personal hygiene, particularly among the men, has improved due to the increased availability of hot water. As a result it can be said that the human capital in terms of being healthy enough to work, go to school and cope with life in general, has increased.
- Living with a solar water heater is perceived as being “easier” than living without. This indicates that a sense of relief is one of the changes caused by the intervention.
- Even though the educational workshop, conducted in May 2009, was not well attended, it can be said that the event was successful in terms of teaching most of those who did attend how to live with a solar water heater.

Financial capital:

- Income generating activities have been supported by the project through the temporary employment of 24 people for technical and enumerator tasks. One permanent part-time position was created for which a young woman from the group of 24 people was chosen.
- Another factor contributing to the financial capital of the beneficiaries is the fact that the technology and its installation was paid for by the Nelson Mandela Bay Municipality. In addition, the municipality is paying for the first year of maintenance. It is still being decided whether the municipality will pay for further maintenance of the technology, or whether the beneficiaries will have to pay for it themselves.

Social capital:

- The follow-up survey did not discover any open conflicts around the issue of distribution of solar water heaters in the community. However, the majority of beneficiaries believe that solar water heaters are “wanted badly” by most of the households without solar water heaters.

Physical capital:

- The solar water heaters themselves, if owned by the beneficiaries, add to the physical capital of the beneficiaries. In the case of the Zanemvula project, the ownership of the systems lies with the beneficiaries.
- In addition, households might use money saved through less expenditure on electricity and/or fuel to purchase new appliances for private or productive use.

Gender capital:

- The women surveyed listed time savings and a sense of relief as changes made to their lives by the solar water heaters. All of the changes they mention are positive.
- The men surveyed listed time savings and personal hygiene as key areas affected by the solar water heaters. They, too, have reported solely positive changes to their lives.

Perception of project and satisfaction with maintenance:

- Even though the proposed beneficiaries did not know about the project before it started, the majority of the selected households welcomed the technology.
- Of the households surveyed, 53% had to call for maintenance within the first three months following installation. The main problem was leakage (96 households), followed by overflow (6 households) and problems with the tap (5 households).
- In only 45 of the 77 households (56% of the maintenance calls) was the problem solved in a way and within a time frame that satisfied the household members.
- A maintenance system has been proposed, with 47% of the households surveyed indicating that they would decide for it, 42% against it. The average amount households indicated they were willing to pay for such a system is R11.60 per month. The majority would like to pay such a maintenance fee through rates and taxes.

- Of the beneficiaries surveyed, more are satisfied with the technology than unsatisfied. The most common reason for dissatisfaction is leaking of the solar water heater.
- The majority of the beneficiaries are not worried about theft of, or damage to, the solar water heaters, and assume that the municipality wants to improve their lives through the installation.
- Job creation was mentioned as the main side benefit of the project.
- Only 12 of the 175 households know that the project is paid for by the municipality.

COMPARISON OF BASELINE SURVEY AND FOLLOW UP DATA

	Total baseline survey (1245 households)	Follow-up group at time of baseline survey (175 households)	Follow-up group at time of follow-up survey (175 households)
Household size (average of all answers)	3 people	3.6 people	3.6 people
No. of children (average of all answers)	1.7 children	1.5 children	1.5 children
No. of households with elderly people	95 households	17 households	21 households
No. of people with special needs	55 people	11 people	8 people
Forms of household income (of all answers)	Grants (46%), Employment (33%)	Grants (47%), Employment (35%)	Grants (47%), Employment (37%)
Municipal water connection	32%	73%	92%
Municipal electricity connection	35%	83%	92%
Lighting	Paraffin (46%), Incandescent (34%), CFL (9%), Candle (3%), multiple lighting sources (9%)	Incandescent (59%), CFL (16%), Paraffin (12%), Candle (0%), multiple lighting sources (13%)	Incandescent (72%), CFL (13%), Paraffin (2%), multiple lighting sources (12%)
Household heating	16%	13%	29%
Fuel used for household heating (of the households that heat their houses)	Paraffin (8%), Wood (7%), Electricity (1%), multiple heating fuels (1%)	Paraffin (7%), Wood (3%), Electricity (2%), multiple heating fuels (1%)	Paraffin (22%), Electricity (4%), Wood (3%), multiple heating fuels (0%)
Cooking fuel (of all answers)	Paraffin (68%), Electric (27%), Wood (1%) and Gas (1%), multiple cooking fuels (3%)	Electricity (62%), Paraffin (30%), Gas (1%), Wood (1%), multiple cooking fuels (6%)	Electricity (82%), Paraffin (13%), Gas (0%), Wood (0%), multiple cooking fuels (5%)
Water heating source (of the houses that heat water)	Paraffin (65%), Kettle (25%), Electric stove (7%), Wood (1%), Gas (1%), Geyser (1%), multiple water heating sources (1%)	Kettle (50%), Paraffin (27%), Electric stove (19%), Wood (2%), Gas (1%), Geyser (0%), multiple water heating sources (1%)	Kettle (75%), Electric stove (19%), Paraffin (7%)
Water heating frequency (of all answers)	3-4 times/day (46%), 1-2 times/day (40%), 5 or more times/day (13%), never (0%)	3-4 times/day (46%), 1- 2 times/day (35%), 5 or more times/day (19%), never (1%)	1-2 times/day (60%), 3-4 times/day (26%), 5 or more times/day (14%), never (0%)

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1. Project Background

“As part of the Nelson Mandela Bay Municipality (NMBM) renewable energy project and the overall contribution to savings required by the Eskom PCP (Power Conservation Phase), the Electricity and Energy Directorate (E&E) decided that the NMBM Solar Water Heating Pilot (SWHP) Project should consider not only the upper socio-economic sector but should be across all socio-economic sectors in the metro.

“Subsequently a tender was advertised, evaluated and adjudicated for the supply, delivery and installation of 1000 low-pressure solar water heating systems. This tender will be seen as a pilot project as it will be the first time that a mass solar heater rollout has been done in the metro. The aim of the project is to reduce the metro’s electrical load and to improve the quality of life by providing a source of hot water to households. The source of hot water will be sustainable, as it will use solar energy as a primary source. It will contribute towards environmentally sensitive and sustainable communities and will reduce CO2 emissions.

“The project also intends to address the use of alternative energy, specifically renewable energy, and its impact in the lower income and indigent socio-economic group. A reduction in the current use of electricity for water heating, the use of safe fuels compared to hazardous fuels, social upliftment, carbon trading, subsidies and feed-in tariffs are some of the issues to be considered. A detailed proposal to national government, which will positively influence a decision to create enabling legislation for a national rollout, is desired.” (Project Manager Van der Merwe, 2009).

According to Van der Merwe (2009) the site for the pilot project was chosen according to the following criteria:

- *The house structures can accommodate the installation of hot water heaters. The roof has 9 trusses, which is more than double that of most of the older houses.*
- *The roof pitch is sufficient.*
- *All of the houses have a kitchen and bathroom/shower.*

- *More than 1000 houses exist in this housing project, enabling the E&E to implement the project in one area.*
- *A central site office can be established.*

2. Specifications of Systems installed

“The tender was awarded to two bidders, namely: Solar Academy of Sub-Saharan Africa (Pty) Ltd and Last Chance General Services. These two service providers are to ensure that all the specifications stipulated in the tender are complied with. The E&E is responsible to facilitate wherever possible and to identify the 1000 households at which these solar water heaters must be installed.” (Van der Merwe, 2009)

The system installed by the company Last Chance consists of an Xstream Tank, but is called the Elnino Solar geyser. Its capacity is 80 liters and it is made out of glass fiber. No metals are used in the tank itself, and it is fitted on a galvanised steel frame with vacuum tubes.

3. Objectives of Report and Method

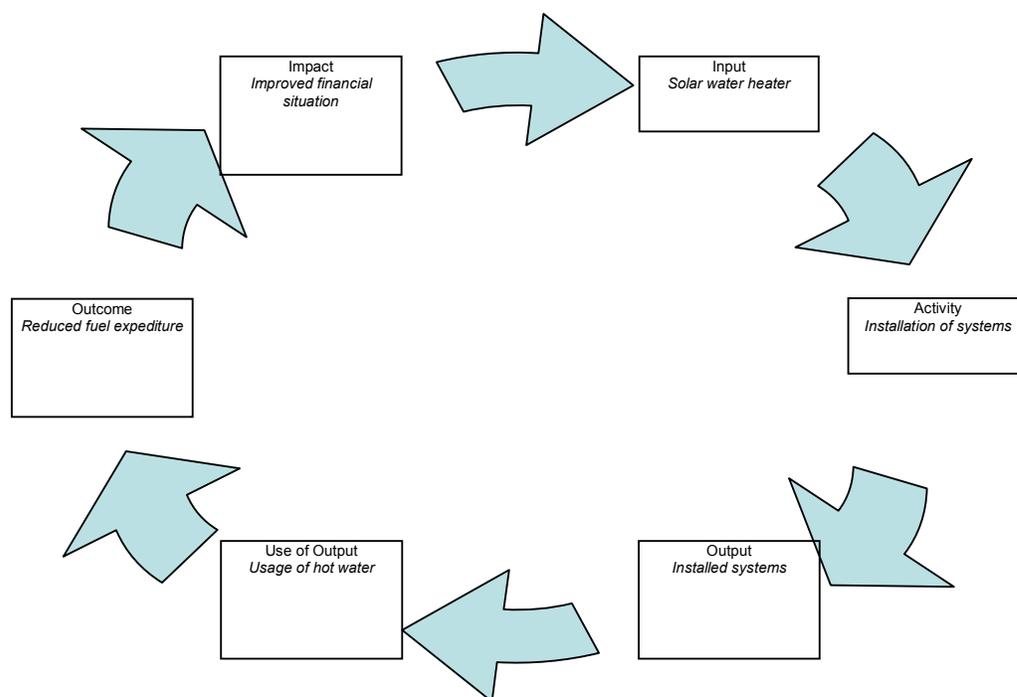
The NMBM included the task of a “social assessment” in the tender for the NMBM Solar Water Heater Pilot Project. According to the tender, the social assessment is meant to “determine the social impact of hot water on the relevant households” (Van der Merwe, 2009). In order to define the content of a social assessment of social impacts, some issues around energy interventions and their impacts have to be looked at. This will be followed by the identification of the objectives and the introduction of the method chosen in order to fulfill these objectives.

3.1. Result chain

Energy itself does not feed, clothe or shelter people. It does not have a defined single impact, but rather provides an asset which can enable all kinds of development. The choices people make about which type of energy to use for different activities like lighting, cooking, heating water and heating their houses is influenced by a variety of factors (i.e. availability, price of fuel and appliances, safety, convenience, efficiency

and other social and cultural considerations). In order to assess the potential social impact of an energy intervention, one has to be aware of the factors influencing energy decisions, and the fact that these factors vary over time.

Further, the term 'impact assessment' should be clarified. The impact of an intervention can be assessed by looking at the "result chain". The result chain begins with an Input, which causes an Activity. These lead to an Output which, if used (Use of Output), results in an Outcome and subsequently an Impact. It can be helpful to apply the result chain model in order to predict possible changes that could be caused by an intervention. Still, it cannot be expected that changes will always occur as modeled prior to a project, as they depend to a large degree on the factors already mentioned. If one assumes that the installation of a solar water heater can bring about changes in the lives of the members of a household, the result chain could, for example, look like this:



According to this theory, an impact assessment would have to analyse the results of an intervention like the solar water heater roll-out at the very last stage of the result chain.

“The positive impacts of access to energy may often become manifest many years after the project ends. Thus, reliable IA [Impact Assessment] for energy should measure impacts beyond the project life cycle. This makes the documentation of conditions at the beginning of the project important, since it provides a picture of the status quo or a baseline from which to measure progress as well as insights into how energy would be used among end-users.” (Development and Energy in Africa, 2008)

The implementation of the NMBM Solar Water Heater Pilot Project is still in progress, and the houses surveyed in the follow-up survey have been living with the technology for only three months, at most. For the purpose of this report, then, the findings shall be referred to as early outcomes rather than impacts of the project.

3.2. Objectives of the Report

The objectives of this report, according to the project summary written by project manager Steyn van der Merwe, are defined as follows:

A full social economic assessment is required to determine the social impact of hot water on the relevant households. The information will not be limited to, but shall include such assessment and comparisons enabling the municipality to assess:

- *The desirability of hot water, post and pre installation;*
- *Methods of water heating post and pre installation;*
- *Safety;*
- *Volumes of water used post and pre installation.*

These issues will be addressed in the following report, and as, according to Van der Merwe, the project has also created an awareness of solar technology, energy efficiency and climate change among various councilors, these topics will be discussed as well.

3.3. Method

The method chosen for the assessment of the social contribution of the NMBM Solar Water Heater Pilot Project was a household survey. The developed questionnaire consisted of a mix of quantitative and qualitative (open) questions. A total baseline survey prior to the installation of the systems was followed by a follow-up survey three months after the installation. The sample size of the follow-up survey was 10% of the total 1263 households identified as beneficiaries for the solar water heater project. The 10% were meant to be representative of the total group, but at the time of the follow-up survey only around 20% of the 1263 households had received a solar water heater. Consequently, the number of households to choose from was limited. According to the project manager, two more surveys will be conducted. These are likely to take place in January and March 2010.

In addition to the questionnaire, a tool called Most Significant Change Stories was used to collect more qualitative information on a voluntary basis. These stories of change have been collected from the project management, the councillor of Zanemvula and employed enumerators living in the community. Two of these stories have been chosen to launch this report.

3.3.1. Baseline Survey

The baseline survey was conducted in March and April 2009, before the installation of the solar water heaters began. A 14-page household questionnaire was developed and a group of 19 Zanemvula community members were selected and trained to be enumerators for the survey.

The baseline survey aimed to collect data from each of the 1263 households chosen to receive a solar water heater through the project. Of the 1263 households, 1247 households were surveyed. Reasons given for being unable to survey the remaining 16 households were that residents were not at home, houses were still under construction, or in some cases the houses had not even been started yet.

The experience of conducting the baseline social survey revealed the following conclusions for the municipality:

- *“Poverty and energy poverty exists in Zanemvula (community within which the solar water heating systems are installed). Water heated by the sun will facilitate for a financial saving for the household and a health improvement, if it replaces the use of paraffin. This use will also benefit into an environmental benefit and carbon trading opportunity.*
- *“The baseline survey contributed towards employment, empowerment and minor skills development for 23 individuals of the Zanemvula community. These individuals will also be used for follow-up surveys. Georgina also trained one of the community members regarding how to co-ordinate and lead follow-up surveys.*
- *“Such a qualitative survey should not have informed the installation of the solar systems immediately. This places too much pressure on the surveying process.*
- *“The municipality should be more involved in the selection process, in consultation with the community stakeholders, of the enumerators.*
- *“Not enough community engagement was held between the municipality and the community. This was done due to tight deadlines regarding the spending of financial funds within the appropriate budget year.*
- *“The concepts of renewable energy and sustainable energy efficiency should be thoroughly explained to the enumerators.”*

(Smit, 2009)

3.3.2. Follow-up Survey

The follow-up survey was done in September 2009, and aimed to survey 10% of the total 1263 households. Since only 20% of households had already received solar water heaters, the survey was conducted using those that had received solar water heaters earliest. These 180 households were each visited by one of four enumerators selected from the group that conducted the baseline survey. The households were asked to answer a 14-page follow-up questionnaire. Of the 180

selected households, in 5 cases the houses were found empty, or an interview was impossible due to drunkenness or the unwillingness of the occupants.

The sample group for this survey does not represent the total group of solar water heater beneficiaries very well. The 175 households differ greatly from the total baseline group, especially when it comes to electrification and water connection rates. This is due to the fact that many households have not paid for their electrical connection and are subsequently not able to consume electricity through it yet. By the time the solar water heater roll-out began, this payment for electricity was far less progressed than the project management expected it to be. The installation of solar water heaters had to begin in the area where at least water connections had already been installed. As a result, the houses that had received water connections (and in most were also using electricity already) first, were the first houses to receive solar water heaters. Thus the number of houses to choose from in order to follow up on the changes caused by the solar water heater installations was extremely limited.

4. Livelihood Outcomes

The findings in this report are organised according to the different household assets as defined in the Sustainable Livelihoods Approach. Below, the different kinds of capitals/assets are described in general and are practically applied within the context of this project. This shows the possible practical areas where the project could influence the livelihood of the participants.

- **Natural capital** includes resources like water, air, soil, vegetation, etc. The NMBM Solar Water Heater Pilot Project could influence natural capital in terms of reduction of greenhouse gas emissions, solar fossil fuel substitution through solar energy, improvement of indoor air quality and reduction in forest depletion.
- **Human capital** includes health, education and skills. These might be influenced by the renewable energy intervention in terms of the training and employment of residents of Zanemvula, time savings due to the availability of hot water, improved health due to cleaner air, and increased knowledge

through education about renewable energy technology. In addition the installation of modern technology may encourage confidence among community members.

- **Financial capital**, such as access to credit, loans, savings and remittances might be increased through the reduction of income poverty through expenditure savings for energy, and increased income security through employment, government financed technology intervention and possible subsidised maintenance of the systems.
- **Physical capital**, including property, equipment and infrastructure might be influenced through the ownership of new technology by the households and increased material wealth resulting in financial savings stimulated by access to the technology.
- **Social capital**, including support mechanisms within families and communities, religious groups, community groups, etc. could be stimulated through an intensified community connection based on the shared experience of solar water heating.

“Access to these assets is affected by the social or cultural situation, the economic position, the political and administrative context and the environmental conditions in which people are living. How these assets are accessed and used are also determined by policies, institutions and processes. Some of these can be influenced by poor people, in which case they can take control – but others cannot. The livelihood strategies which people adopt will result in their lives becoming more secure or more vulnerable. The more secure a household, the better it can cope with the many shocks, stresses and trends that affect its members’ lives. Strategies in an urban environment might include income-generating activities such as selling goods, fishing, making pots, selling firewood and urban agriculture. They may also include spending less when times are hard – for instance, cutting back on food, transport, education and health.” (Bannister, 2002).

The NMBM Solar Water Heater Pilot Project could be seen as a government intervention. In theory, participants had the choice of whether they wanted a solar water heater to be installed on their roof or not. In practice the roll-out was

unfortunately rather forceful in at least one case (the household complained that their decision against the technology was ignored by the installation technicians). The assumed influence on the household assets by the provision of hot water is explained in the fifth chapter. If these assumptions are correct, the solar water heaters will provide households with increased capital which they can choose how to use in designing their livelihood strategies. A better social network to fall back onto, improved access to financial capital due to expenditure savings, and increased human capital through better health and training are just some of the examples of how solar water heaters might enable households to cope more easily with shocks, stresses and trends.

The findings of the baseline survey shall be introduced in the graphs below. The dark green lines indicate the use of baseline data and light green the use of data from the follow-up survey. If not indicated otherwise, the graphs and percentages represent the numbers of given answers.

4.1. Community profile

The total group of beneficiaries of the NMBM Solar Water Heater Pilot Project surveyed in the baseline survey consists of 1247 households living in government houses. Zanemvula is a government housing project and consists of 3432 houses in total. Since the baseline survey was conducted, around 800 additional self-built shacks have been added to the community.

In the group of beneficiaries, each house is on average occupied by three people, some households are as small as one person and some have up to 12 household members. Most houses have one to three inhabitants. The number of children per households is on average 1.7, with most families having either one or two children. Only 95 households have someone over 60 years living with them and 55 people with special needs have been identified in the community. The typical decision maker is, if female, either a mother or wife and, if male, either a father or husband. The majority of households are headed by a female. Very few households are lead by elderly or young people.

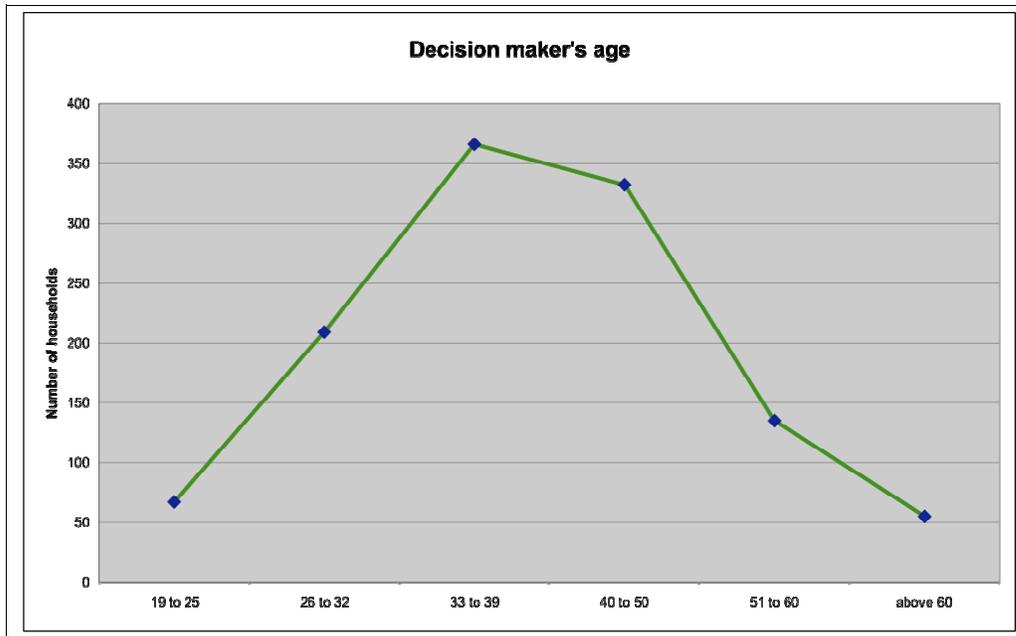


Figure 1: Decision maker's age (Baseline)

Of the total group of 1263 beneficiaries of the NMBM Solar Water Heater Pilot Project, only 31% of the houses had a municipal water connection before the project started. Out of the total number of houses in the community, only 5% paid for water from either the municipality or a neighbour.

About 35% of the houses in Zanemvula had an electricity connection before the project started, and paid for the service, again either to the municipality or a neighbour. Another 7% of households said that they did have electricity, but did not pay for it, and the remaining 55% were living without electricity.

On average about 1.6 people in each household were earning an income before the project started. The range went from one person earning an income up to households in which more than five people were contributing to the monthly household budget. The majority of the households were dependent on government grants and employment. A few people receive a pension or remittances or have a small business.

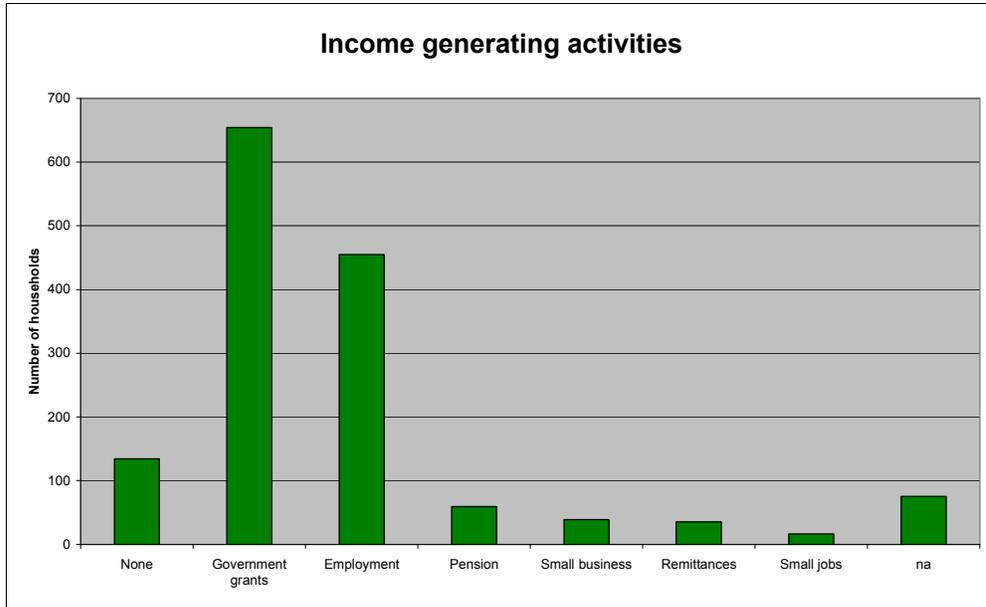


Figure 2: Income generating activities (Baseline)

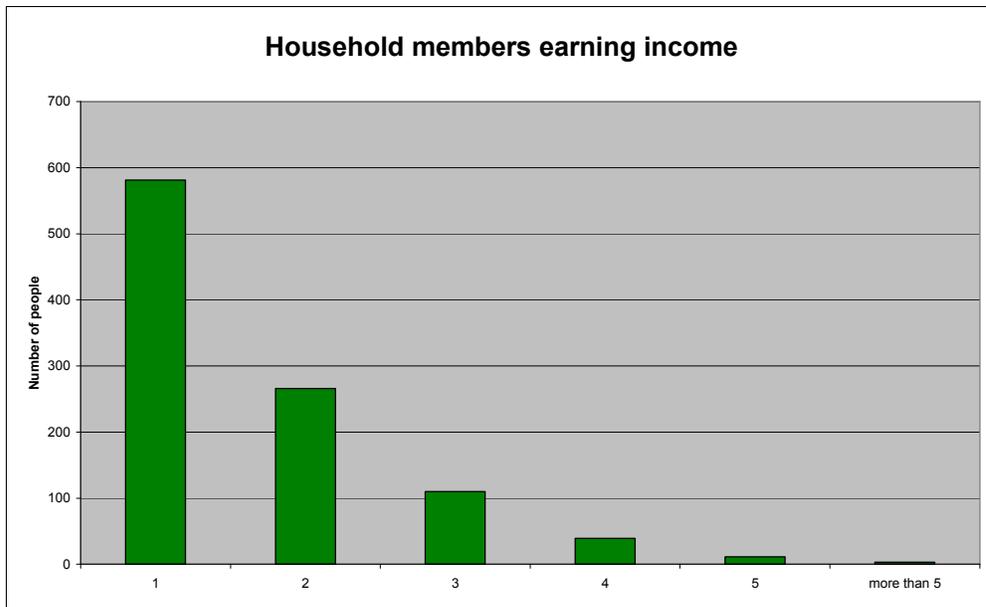


Figure 3: Household member's earning income (Baseline)

The primary energy source used for lighting in the baseline survey was paraffin (used by 46% households), followed by conventional light bulbs (34%) and, far behind, compact fluorescent lights (9%) and candles (3%). Nine percent of households used more than one source for lighting.

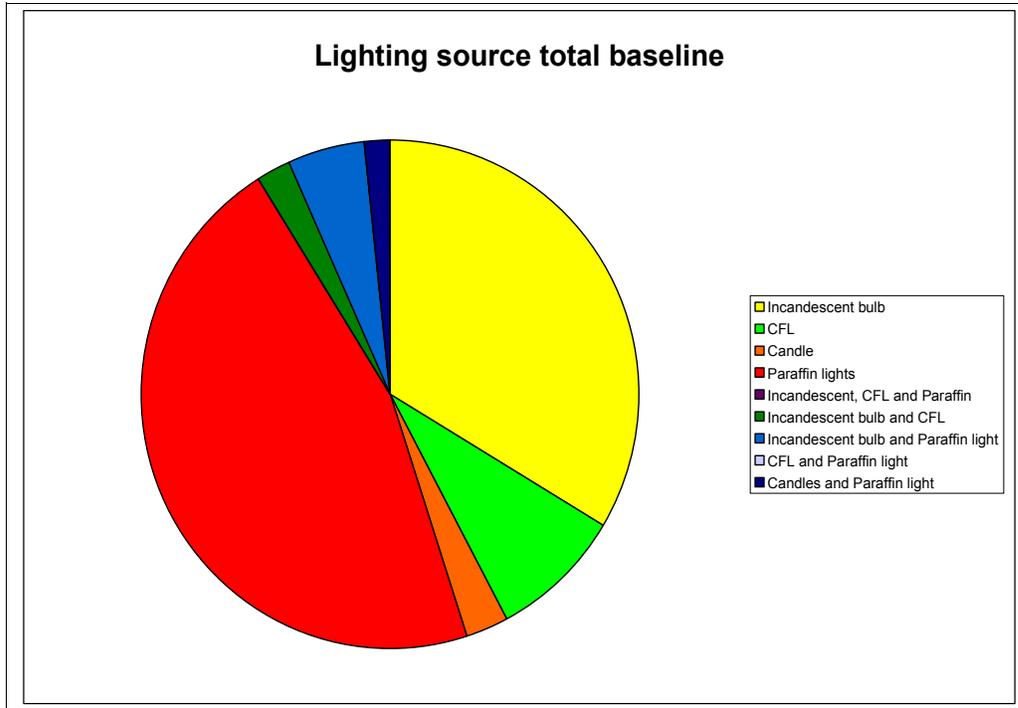


Figure 4: Lighting source total baseline

According to the baseline survey, only 6% of households heated their houses in winter. The most common fuels used for heating were paraffin (8%) and wood (7%). Only a few households made use of electricity (1%) or gas heaters (1%). Only 1% of households used multiple fuels for heating the house.

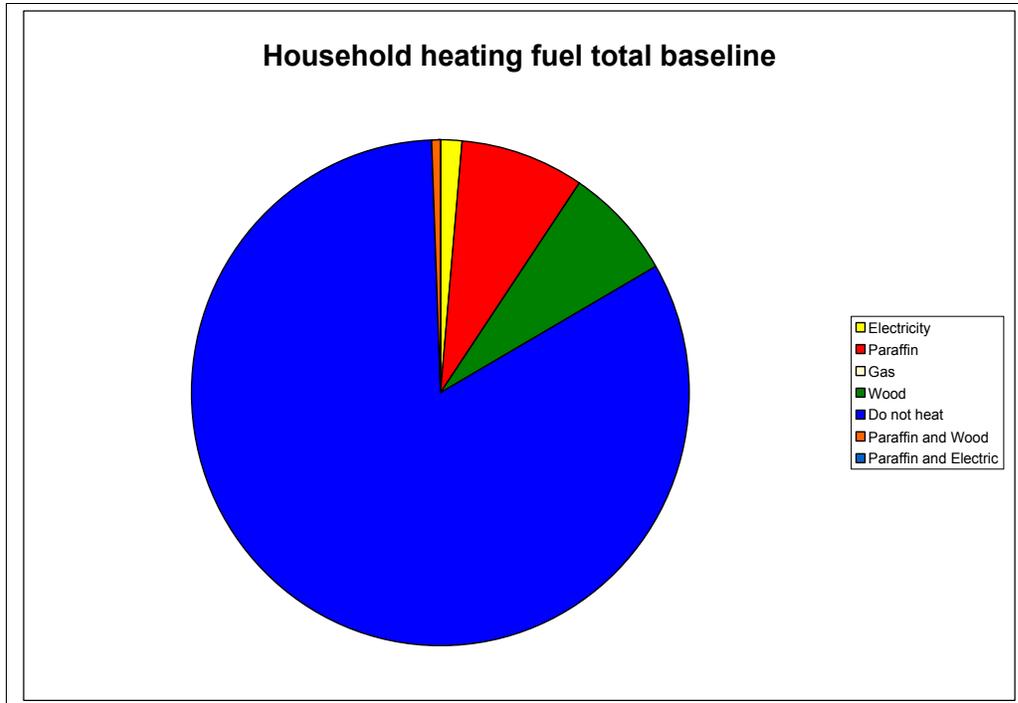


Figure 5: Household heating fuel total baseline

The typical fuel used for cooking, according to the baseline survey, was paraffin (69%), followed by electricity (27%), gas (1%) and wood (1%). Only 3% of households used more than one fuel for cooking.

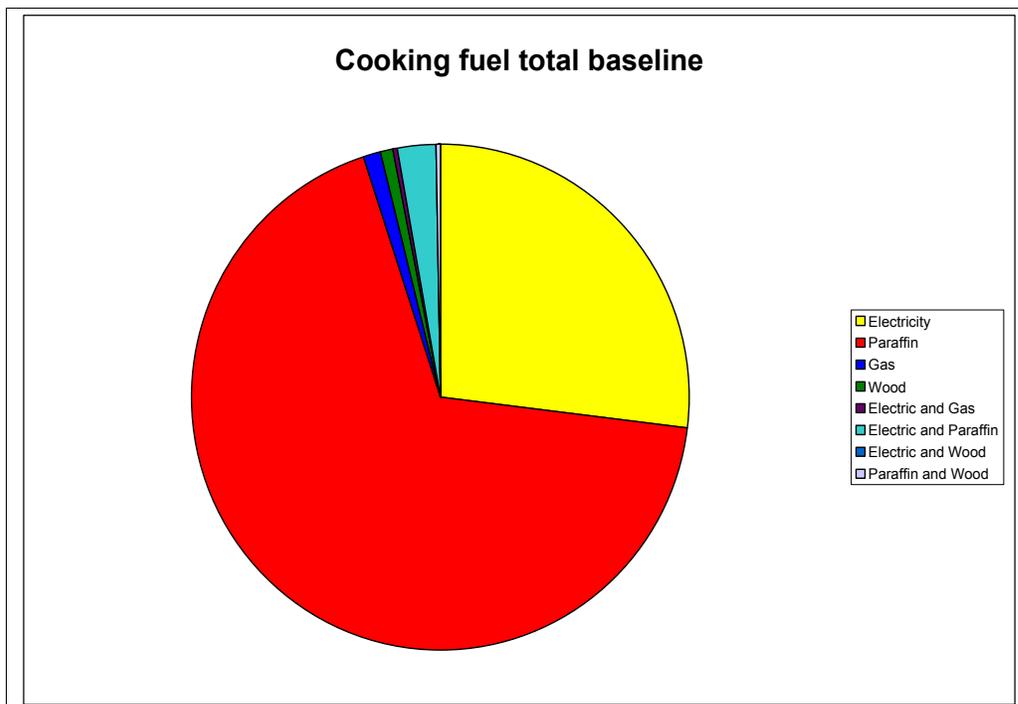


Figure 6: Cooking fuel total baseline

These figures show common fuel usage habits for a community which is largely not electrified. Multiple fuel usage is common in Zanemvula as income levels do not allow households to rely on a single fuel. Paraffin and gas are used when they can be afforded and wood, which is mainly available for free in the surrounding area, in times of less money. The availability of paraffin is, as in most urban low-income settlements in South Africa, very high in Zanemvula. All of the 21 shops in Zanemvula sell paraffin; in fact they sell paraffin only. Gas does not seem to be available at all in the community and wood is sold by only one person.

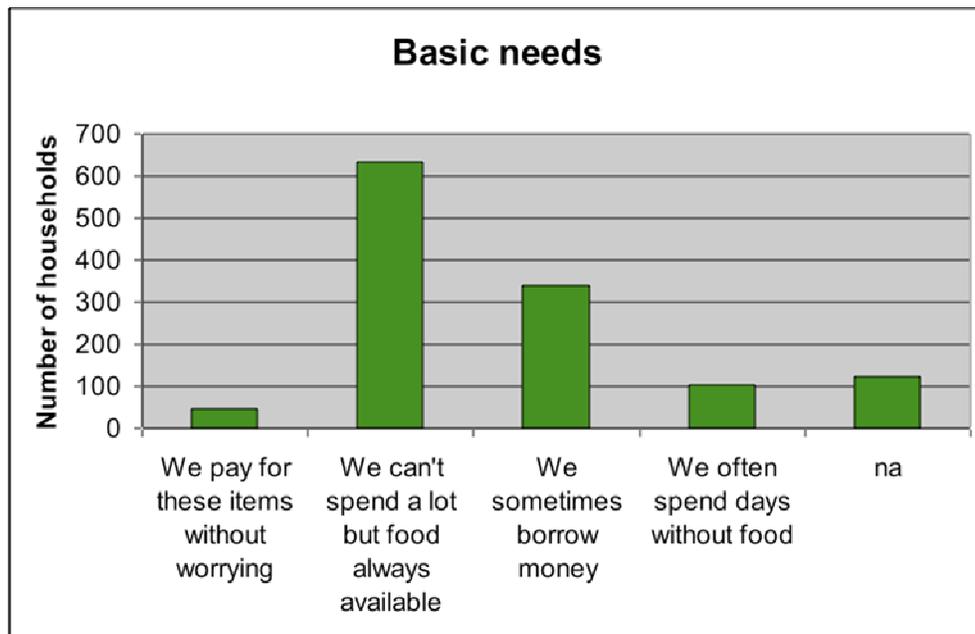


Figure 7: Basic needs (Baseline)

When asked which of the given statements concerning basic needs such as food, education, and clothing reflects best their situation, just over half of the households surveyed stated that they “can’t spent a lot of money but food is always available” (634 households). In contrast, others said that they “sometimes borrow money to pay for food, clothing and schooling” (341 households), and “often spend a few days without food and kids don’t go to school” (102 households). Very few respondents answered that they “regularly pay for these items without worrying too much about the costs” (46 households).

4.2. Natural Capital

The possible benefits from the solar water heater installation, looking at the natural capital of a household, could theoretically include the reduction of greenhouse gas emissions, the substitution of fossil fuel with solar energy, an improvement in indoor air quality and a reduction in deforestation. A number of changes are needed within the households in order to achieve these benefits. In order to effect a reduction in greenhouse gas emissions, household members would have to use the hot water coming from the solar water heaters. This would then theoretically reduce the need for heating water through other means like electricity, paraffin, gas or wood, which in turn has an impact on air quality and deforestation.

Although it is not intended to provide figures for the possible emission reductions, the qualitative data from the survey shows that the usage of wood, gas and paraffin has declined and more households are using the kettle for their water heating needs. This change is significant and very likely to be caused by the increased number of electrified households in the sample group (Table 1). Taking the frequency of water heating into consideration, it becomes clear that people also heat water significantly less often per day, in other words use less fossil fuel for water heating purposes (Table 1).

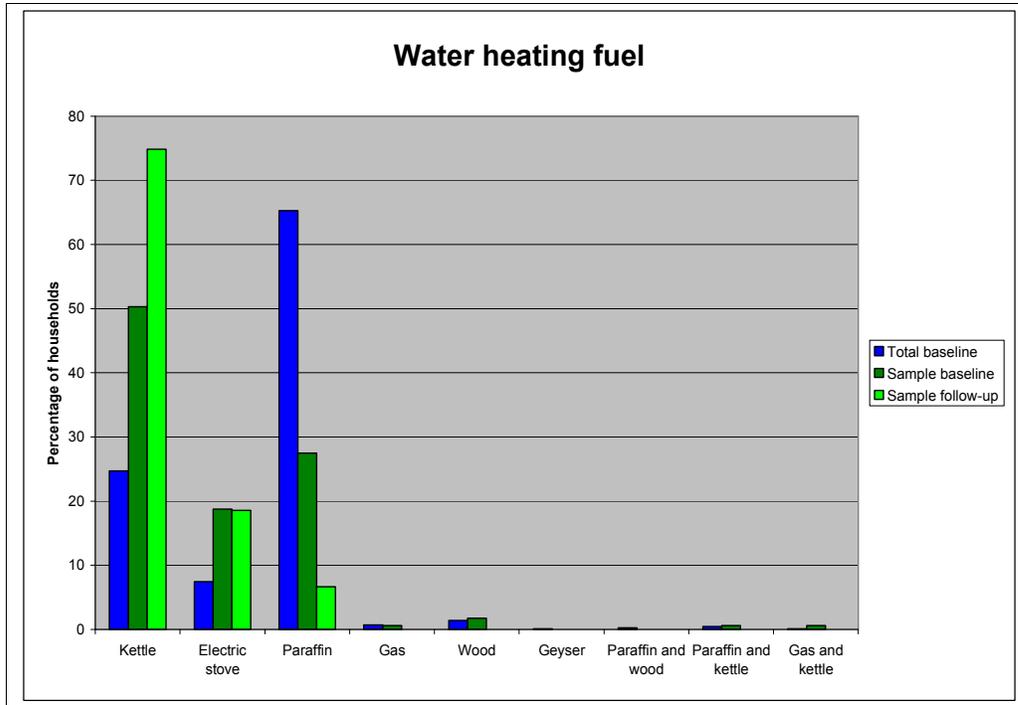


Figure 8: Water heating fuel (Comparison)

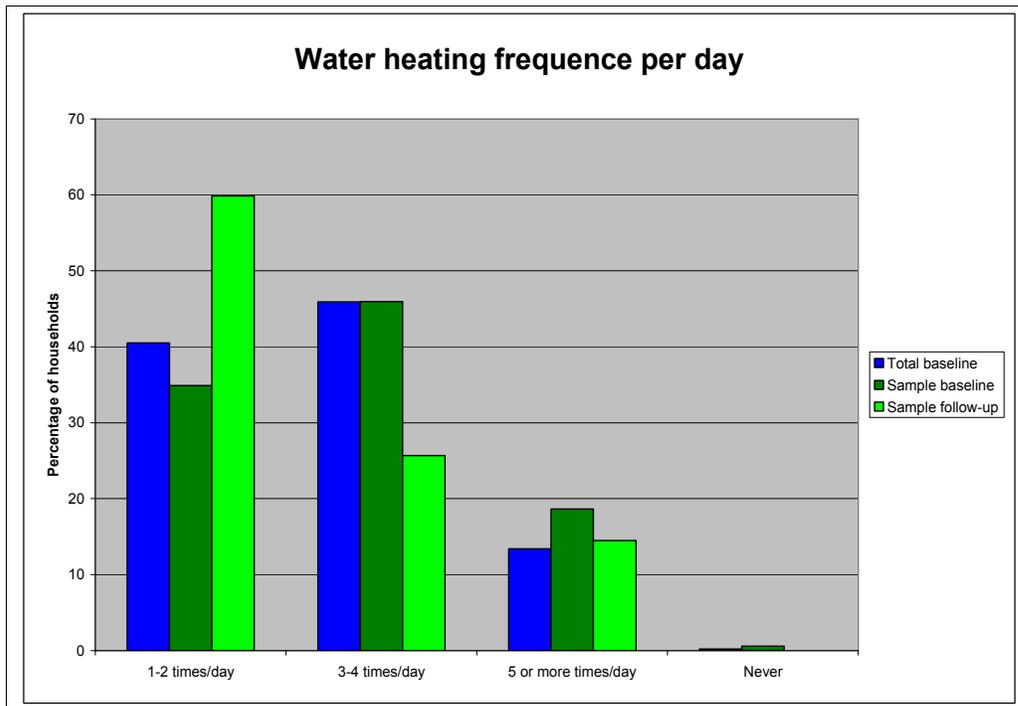


Figure 9: Water heating frequency per day (Comparison)

The cooking and heating habits in the group have also changed significantly; again this change is very likely to be linked rather to the introduction of electricity to the

households than the installation of solar water heaters (Table 1). Households have almost completely stopped using wood and gas for cooking, paraffin usage has declined and electricity usage increased.

The situation around lighting shows a slightly less significant change (Table 1). Here paraffin usage has decreased and use of incandescent light bulbs has increased.

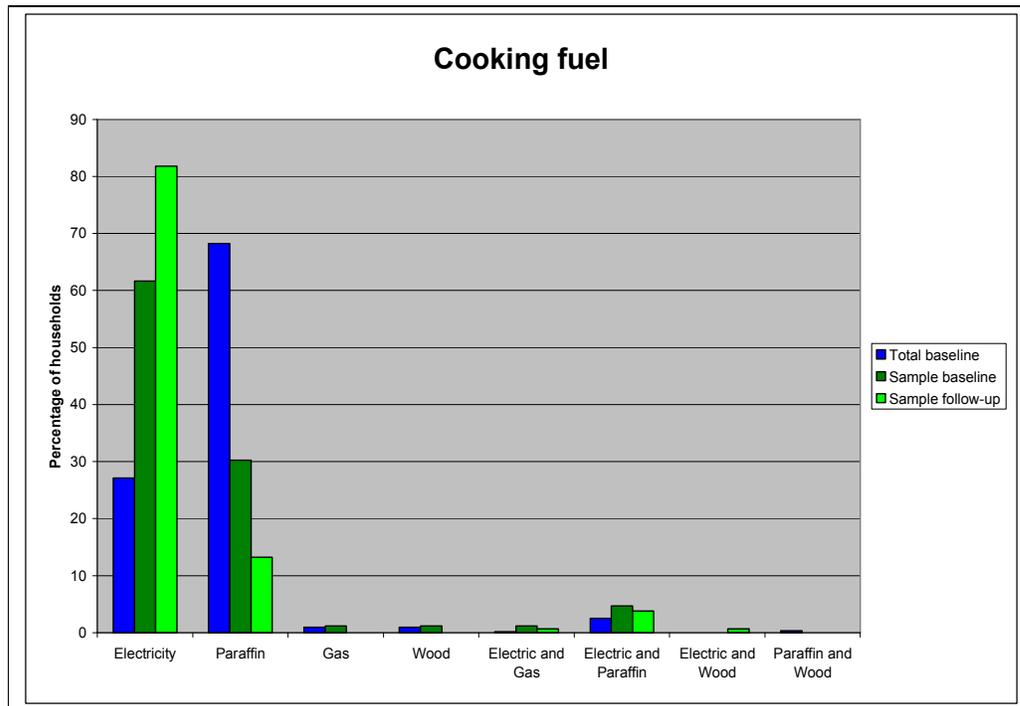


Figure 10: Cooking fuel (Comparison)

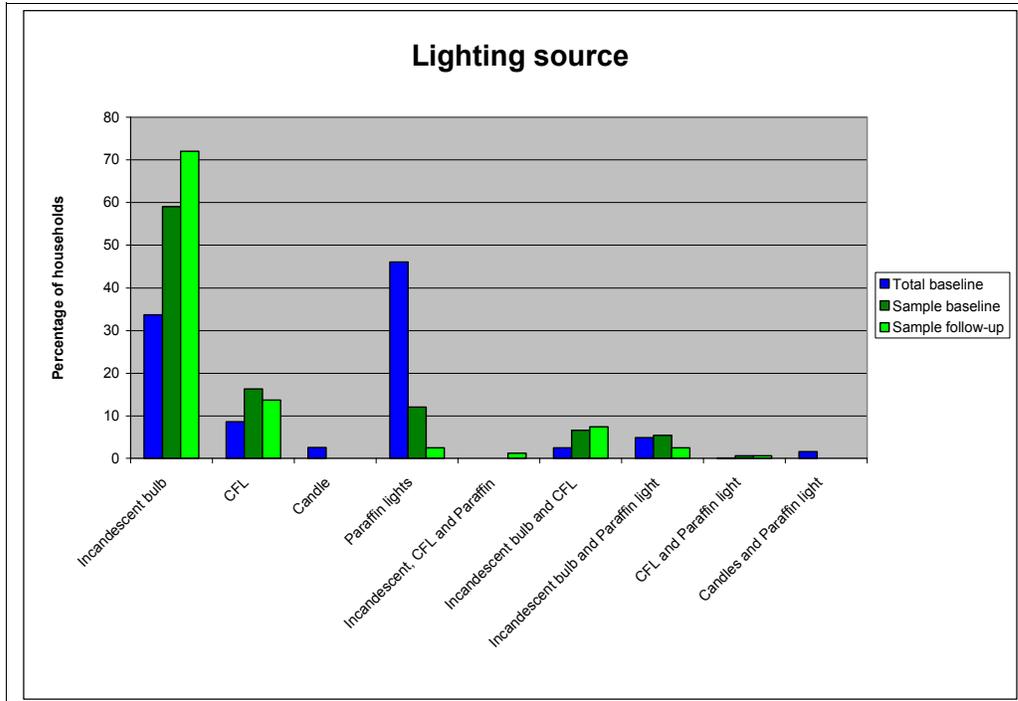


Figure 11: Lighting source (Comparison)

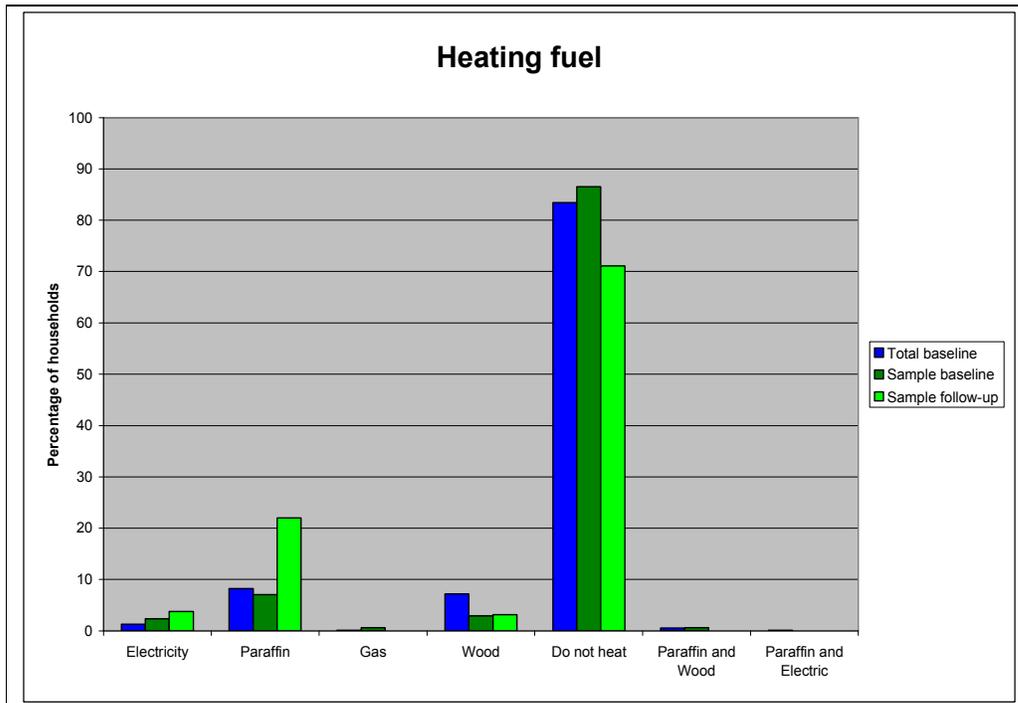


Figure 12: Heating fuel (Comparison)

The percentage of households heating their homes has risen from 13% to 29%, while the percentage of households not heating their homes remains the highest. The

majority of households that have started heating their houses use paraffin for this purpose. Electricity usage has increased slightly and wood usage has remained the same. The recent electrification of these houses has increased the usage of electricity for lighting and cooking purposes, while paraffin remains the most popular source of energy for heating.

Table 1: Tests for statistically significant differences in count data (using Chi-squared tests) between the total set of baseline surveys (TB), the sample set of baseline surveys (SB) and the follow-up surveys of the sample set (SF)				
	Sample Baseline vs Total Baseline	Sample Follow up vs Sample Baseline	Sample Follow up vs Total Baseline	Degree of freedom p <
Lighting	p<0.0005	p<0.005	0.0005	10
Water heating frequency	NS	p<0.0005	p<0.0005	3
Water heating source	p<0.0005	p<0.0005	p<0.0005	8
Cooking source	p<0.0005	p<0.0005	p<0.0005	7
Household heating source	NS	p<0.0005	p<0.0005	6

The indoor air quality is likely to be improved in most of the households due to the changes in cooking and lighting habits, however this positive benefit is balanced out by the households which had not been heating at all before and have now started heating with paraffin. The air pollution may have become worse in these households, but warmth has a positive effect on health and may bring other benefits. Likewise, the increased number of households spending money on household heating could be related to a change in their financial situations, however no significant change in the income situations of these households is apparent. The fact that more households have actually spent a winter in their new houses might have caused the respondents to either remember their heating habits in more detail or change their heating habits due to different conditions in the new houses. Wood usage has decreased in the group which could have a positive impact on the local forest stand, but in the case of Zanemvula wood is mostly collected from nearby bushes and shrubs.

The heated water from the solar water heaters is mostly used for bathing (155 households) and washing dishes (150 households). Almost half of the surveyed households use the heated water for speeding up their cooking and saving even more fuel (68 households). Due to the high number of complaints about the smell, taste and colour of the water coming from the solar water heaters, only 45 households use this water for making tea or coffee. Washing clothes with hot water does not seem to be the most pressing issue as only 41 households mention using it for this purpose.

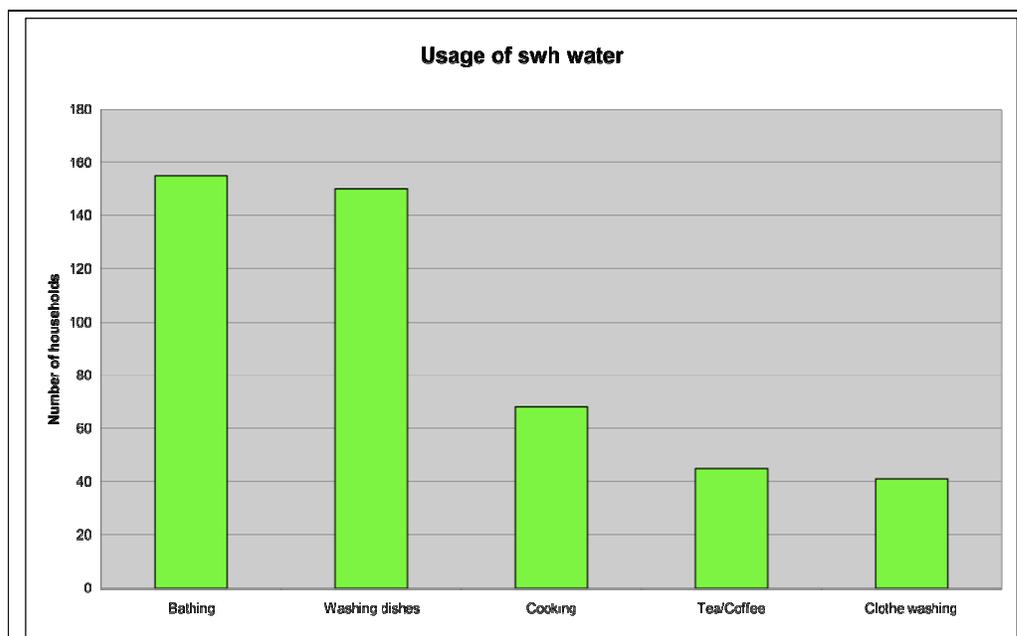


Figure 13: Usage of swh water (Follow-up)

Energy poverty has significantly declined through the increased number of electrified houses and the installation of solar water heaters. Wood and paraffin usage has decreased and more people are using electricity for cooking, lighting and the heating of water. In addition, 16% more households heat their homes in winter. Fuel and electricity usage for water heating has dropped, which might result a reduction of greenhouse gas emissions. It is unclear if the overall indoor air quality has improved, due to the fact that an increased number of households are heating their homes and using paraffin for this purpose. The air quality has improved in those houses that have changed their fuel usage from wood and paraffin to electricity. Bathing and dish washing are the two activities for which water from the solar water heaters is used by most households.

4.3. Human Capital

In terms of the benefits of the NMBM Solar Water Heater Pilot Project around human capital the provision of training and creation of employment, improved health and education are the most relevant factors. Additional positive effects could be increased time resources, allowing the beneficiaries to focus more on health improving or income generating activities.

The tender for the project asked the contractors to involve people from the Zanemvula community in the installation of the solar water heaters. According to the available information, six men from the community received on-the-job training and were subsequently hired for work on the project. However, this did not result in any formal training for these men, nor did it lead to any kind of permanent employment. It may be possible for some of these men to use the experience gained with the technology to convince another company to hire them, or even get involved in the maintenance of the installed systems. Another 18 people were temporarily employed as enumerators for the implementation of the surveys this report is based on. This group received training on survey related issues and went on a field trip with the suppliers to find out more about solar water heating technology. Some of the enumerators will be involved in future research on the project and one member of the group was employed on a long-term basis to set up and manage a “maintenance, information and complaints office”.

The health situation in the surveyed households appears to have improved in the three months which have passed since the baseline survey. The number of households that reported coughing was halved. Sore throats, TB and red and itchy eyes were reported in fewer than half of the households that had reported them before. The only exception was the occurrence of colds and flu. The number of households reporting the occurrence of colds and flu has increased from 57 to 93 out of the 175 surveyed households. However, the frequency with which colds and flu occur has slowed down a little. Fewer households mentioned suffering from colds and flu “often”, but stated instead that they occurred “not a lot”; on the other hand the number of households stating that colds and flu occur “hardly ever” has decreased.

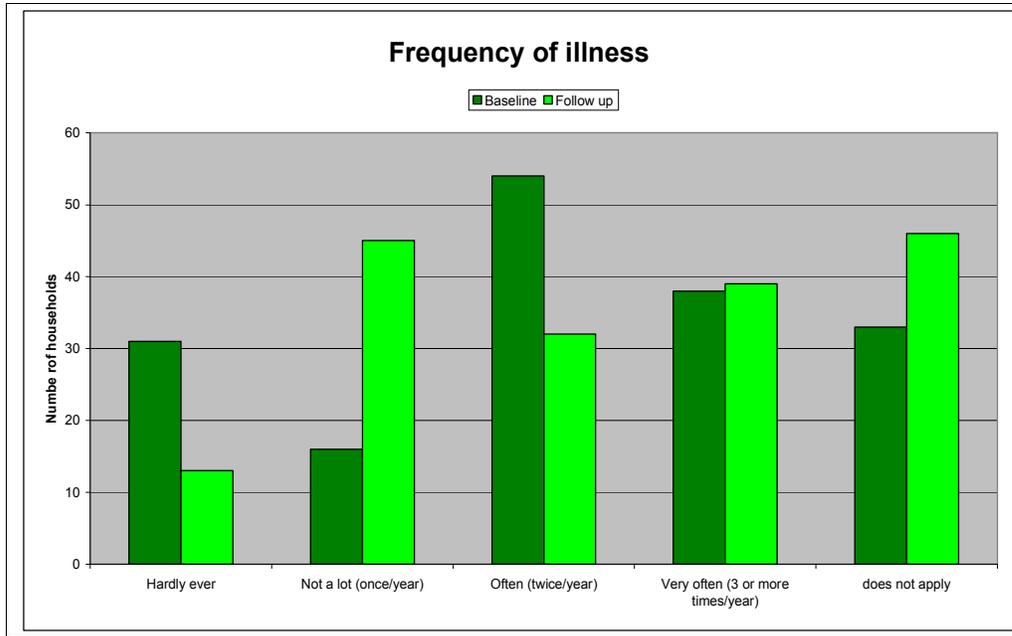


Figure 14: Frequency of Illness (Comparison)

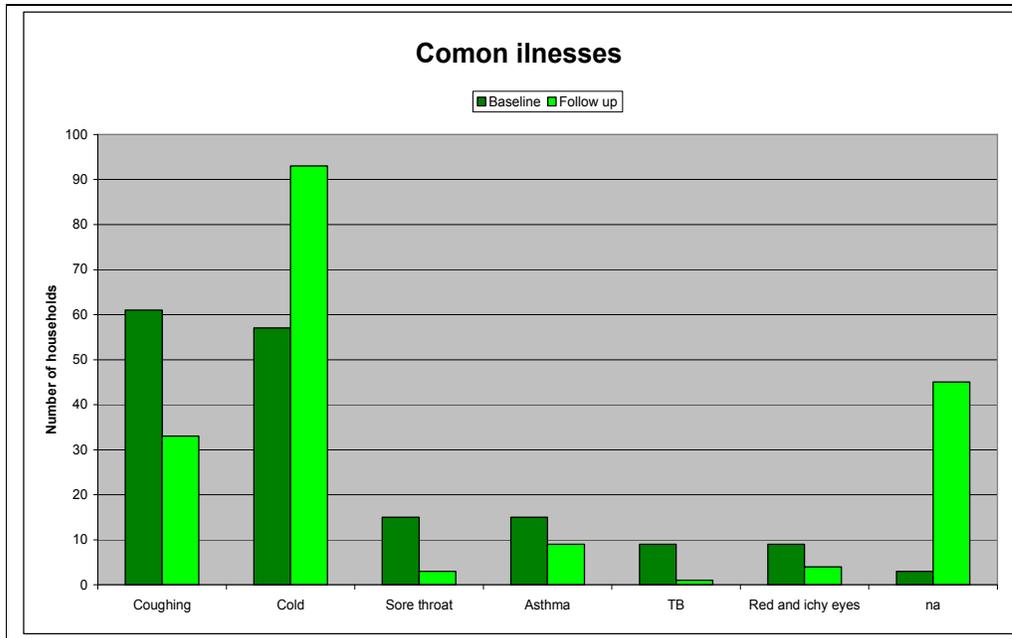


Figure 15: Common Illnesses (Comparison)

When one looks at the qualitative information this impression is strengthened. Of the participants who reported a positive impact from the solar water heaters on the health of their households, 18% hold the opinion that the occurrence of coughing has decreased. A positive impact on the risk of catching flu or colds through access to warm baths was reported by 14%, and 6% are of the opinion that the personal

hygiene of their household's members has improved. As mentioned earlier, the improved indoor air quality of some houses and the move to indoor heating in others could be possible reasons for the decreased occurrence of coughing. The perception that the cold and flu risk has decreased through access to hot baths conflicts with the quantitative data, which shows a rise in the occurrence of colds and flu. The reasons for this contradiction are unclear at this point. As diarrhea is one of the main health problems in the Zanemvula community (interview with nurse at community clinic on 28.09.2009), improved personal hygiene might have a positive impact on the infection rates over the long term. In most cases, however, this impact is unlikely to be linked to the solar water heater as the impact is rather hidden.

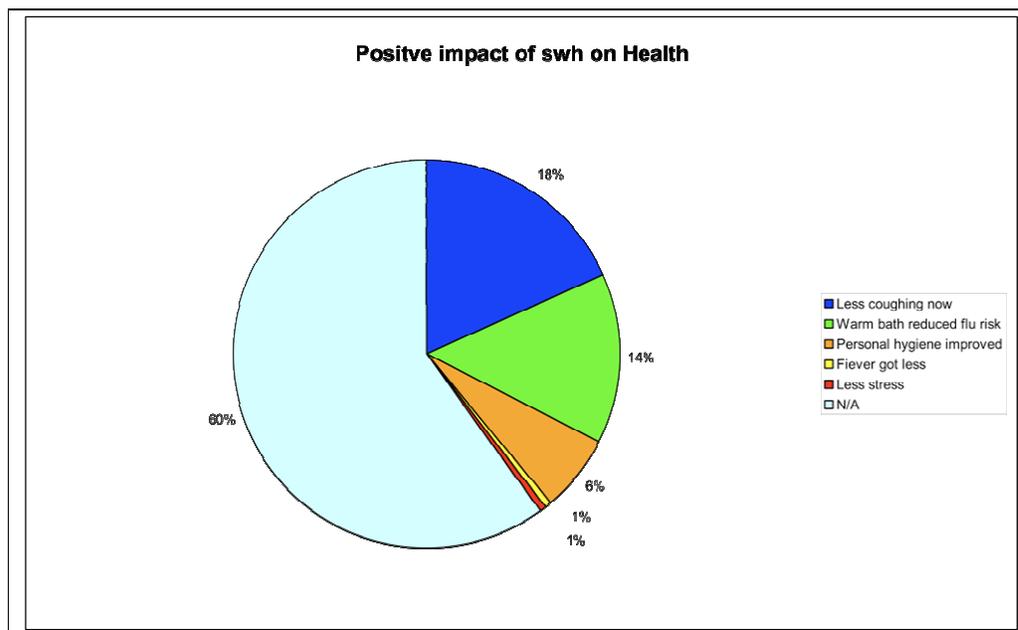


Figure 16: Positive impact of swh on Health (Comparison)

Very few households reported negative health impacts resulting from the solar water heaters. The only negative reports were of children burning their hands on the hot water (2 households), children getting sick from showering too much (2 households), children becoming sick due to leaking of the solar water heater (1 household) and high blood pressure caused by stress relating to leaking of the solar water heater (1 households). Although, in the open question, only two households spoke about

children burning their hands, in response to a question explicitly asking whether someone in the household had been burnt by water from the solar water heater, 18 households answered yes.

According to the participants' perceptions, the health situation among the surveyed households has improved: 70 households linked their improved health to the provision of hot water. As a result, it can be said that the human capital in terms of being healthy enough to work, go to school and cope with life in general has increased.

Next to an influence on the physical health of people and families, there are also certain expectations and changes documented which might be more linked to psychological well being - about emotions like happiness, pride and disappointment. In the baseline survey the open question "How do you think the solar water heater will change your life?" was asked to the whole community. By far the most common answer was the expectation that electricity would be saved through the usage of hot water from the solar water heater (470 answers), followed by the expectation that money would be saved (266 answers) and lastly that time would be saved (262 answers). Some households said the solar water heater would improve their entire lives (89 answers) and others were simply looking forward to having hot water in their homes (139 answers). Only 38 households mentioned that they would, once they had the solar water heater, be able to have hot baths, and 42 expected general energy savings would occur. It is unclear whether these energy savings are linked to decreased fuel usage for household purposes or to the energy which might be saved through living with a solar water heater. Some households expressed more than one expectation.

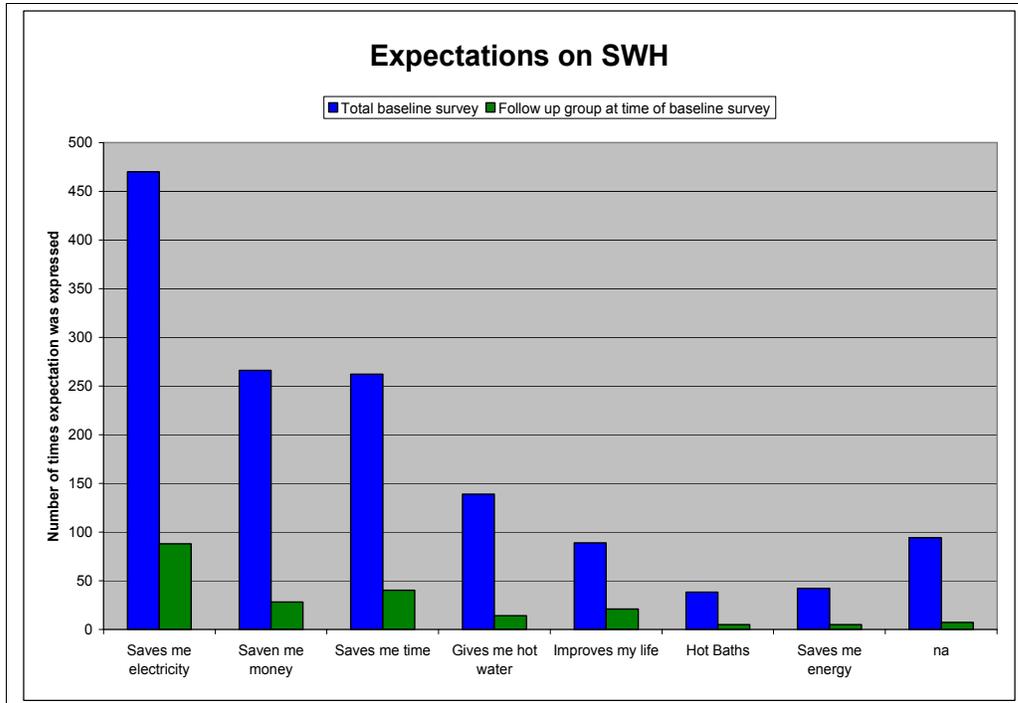


Figure 17: Expectations on SWH (Comparison)

In the baseline survey the expectations of the sample group showed similar rankings to those of the whole community.

In the follow-up survey the open question “How do you think the project installation has changed your life?” was answered most often with “my life is easier now” (69 answers). The second and third most common answers were that the solar water heater saves time (26 answers) and/or money (22 answers), followed by that one “can wash with hot water all the time” now (20 answers). Less common answers given were “no change at all” (4 answers) and “improved personal hygiene” (3 answers). Others were “hot water regardless the financial situation”, “improved nutrition”, “independence from Eskom” and “hot water on hot days”. In some cases households again mentioned more than one change.

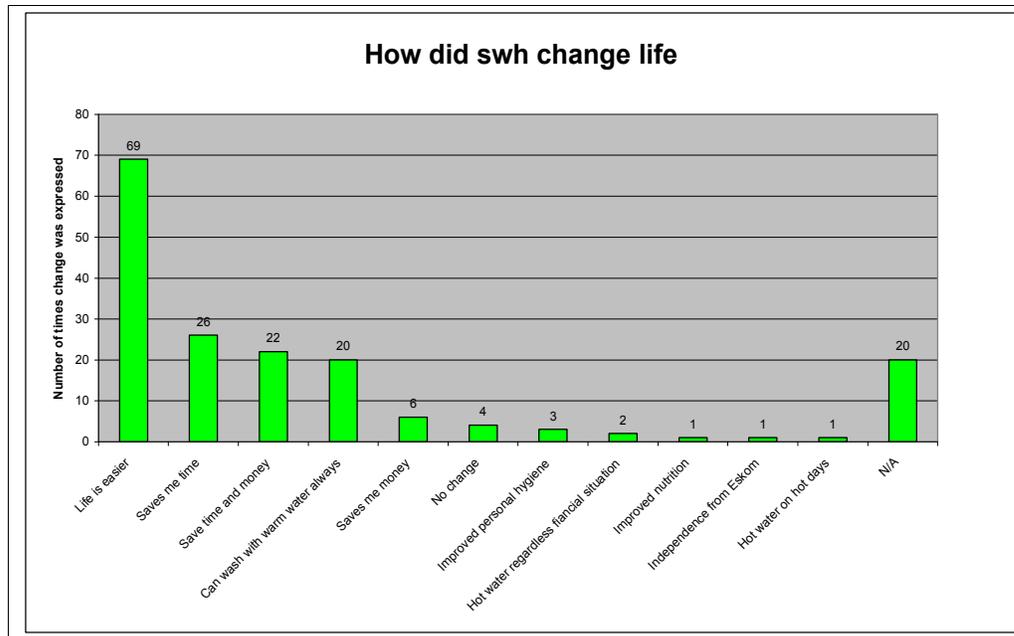


Figure 18: How did swh change life (Follow-up)

The changes reported by the households are very much in line with the expectations expressed before the installations. The only exception is the expectation that life will improve, which might have been expressed in the follow-up survey through the statement that life is easier with the solar water heater. It can be said that the changes experienced and expressed by the households are almost completely positive changes, with the exception of the households that said that hot water is only available on hot days. Even this answer could be read in a positive way, saying that hot water is available on hot days. The expectations of the community seem to have been fulfilled, at least in the group of 175 households surveyed. The assumption that the provision of hot water might have a positive effect on the mental health of the community through relieving part of the burden of managing the challenges of life in a low-income community like Zanemvula, is a difficult one to test with a general household survey. More qualitative work by specialised people is needed in order to prove this assumption right or wrong. However, looking at the number of households that perceive life with a solar water heater as “easier” than life without, the fact that relief is one of the changes caused by the intervention is clearly shown.

In May 2009, shortly after the solar water heater installations had begun, the municipality organised a workshop in Zanemvula and invited the entire group of

beneficiaries to participate. Of the households involved in the follow-up survey, 26% stated that someone from their household had attended the workshop in May 2009.

At the workshop, issues related to solar water heating were discussed. A DVD about climate change and solar water heating was shown and a number of people working in the field shared their knowledge with the audience. The feedback regarding the workshop in the open question was mostly positive. Common responses from the surveyed households were: “We learnt a lot” (49%) and “it was useful” (12%). Complaints reported were that the “acoustics were bad due to too many people” (3%), “not enough information was given about solar water heater” (2%) and that the entire workshop was a “waste of time” (2%).

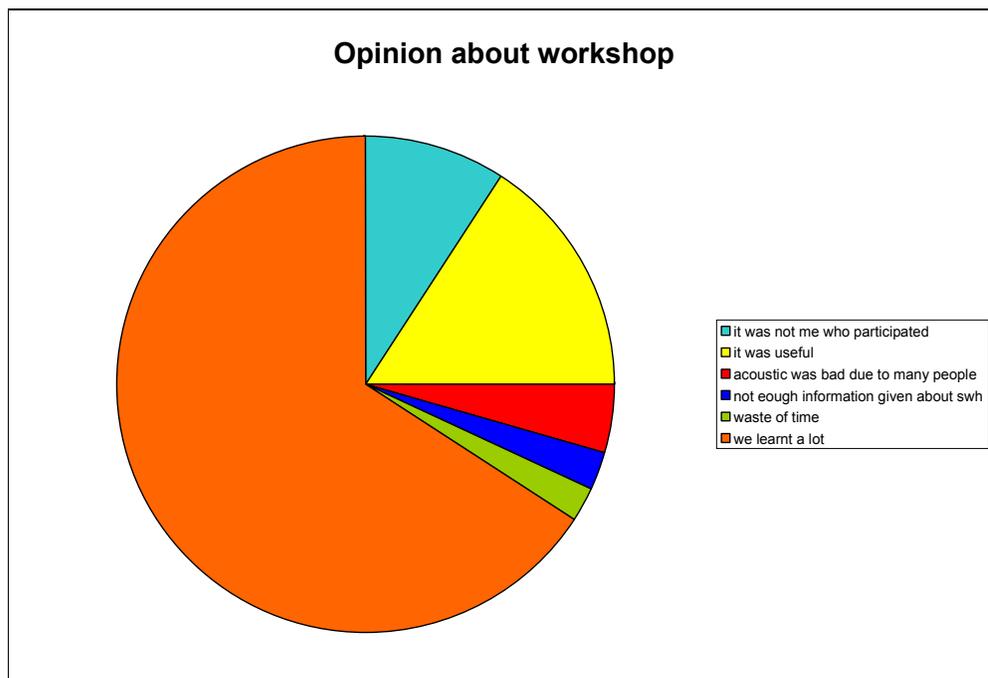


Figure 19: Opinion about workshop (Follow-up)

Even though the workshop was not well attended, it can be said that the workshop was successful in terms of transferring knowledge important for life with a solar water heater to most of those that did attend. However, it is unlikely that the participants will link the benefits and positive changes experienced to their municipality, as only very few know who to thank for the project. Of the total number of households at the workshop only 12 remembered that the project was funded by their municipality. If

participants remember the question at the end of the questionnaire that asked “Why is the municipality implementing this project?” the possibility for a better reputation for the municipality may arise.

The workshop does not appear to have had much influence on the participants’ familiarity with terms like sustainable energy, renewable energy or energy efficiency. In both surveys 160 out of the 175 households stated that they had not heard of any of these terms. In fact, respondents indicated familiarity with one of these terms slightly more often in the baseline survey than in the follow-up survey. This can be explained by the fact that in some cases the follow-up and baseline questionnaires were answered by different members of the same households.

Despite the lack of results in terms of theoretical knowledge, the majority of the households surveyed appear to be trying to save energy when possible and are convinced that by saving electricity in the household the current energy situation in the country can be influenced. Again, when looking at attitudes around energy saving question for question, no real influence from the workshop is visible. The small changes in the numbers can best be explained by the experience gained about electricity prices through actually living in an electrified house.

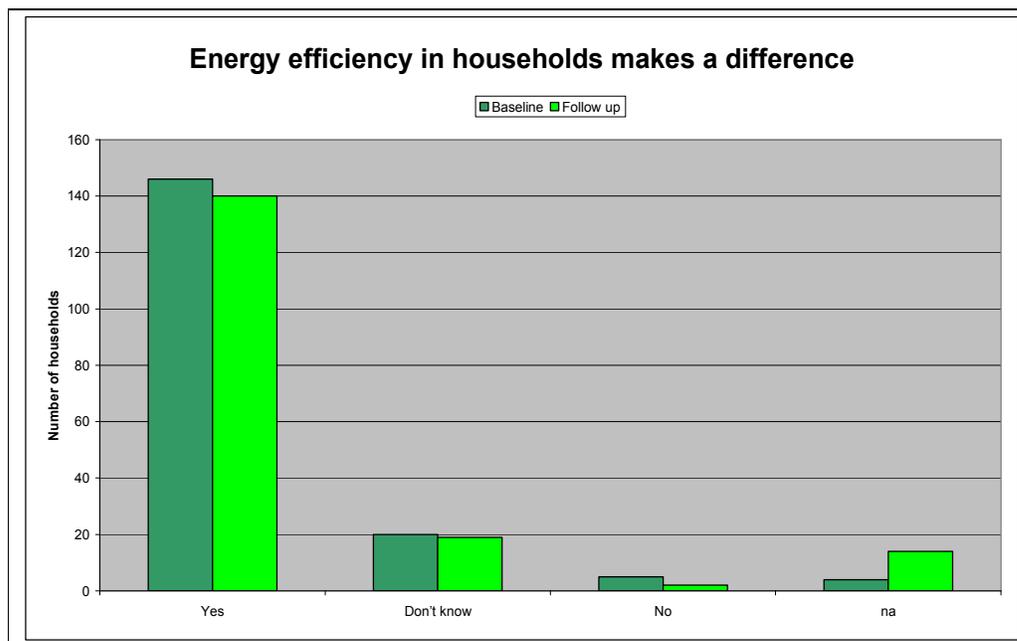


Figure 20: Energy efficiency in households makes a difference (Comparison)

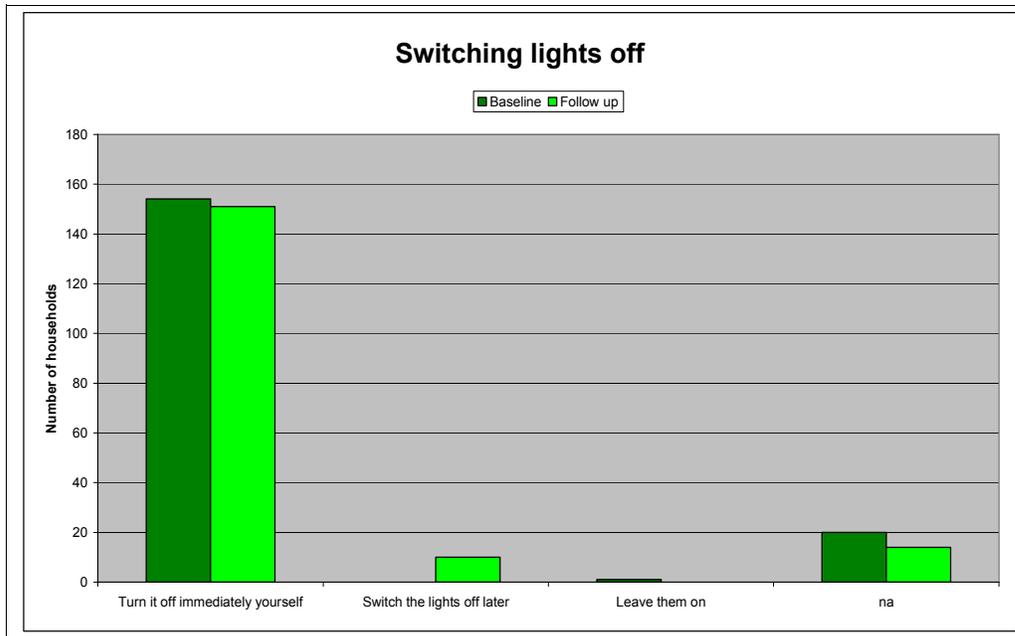


Figure 21: Switching lights off (Comparison)

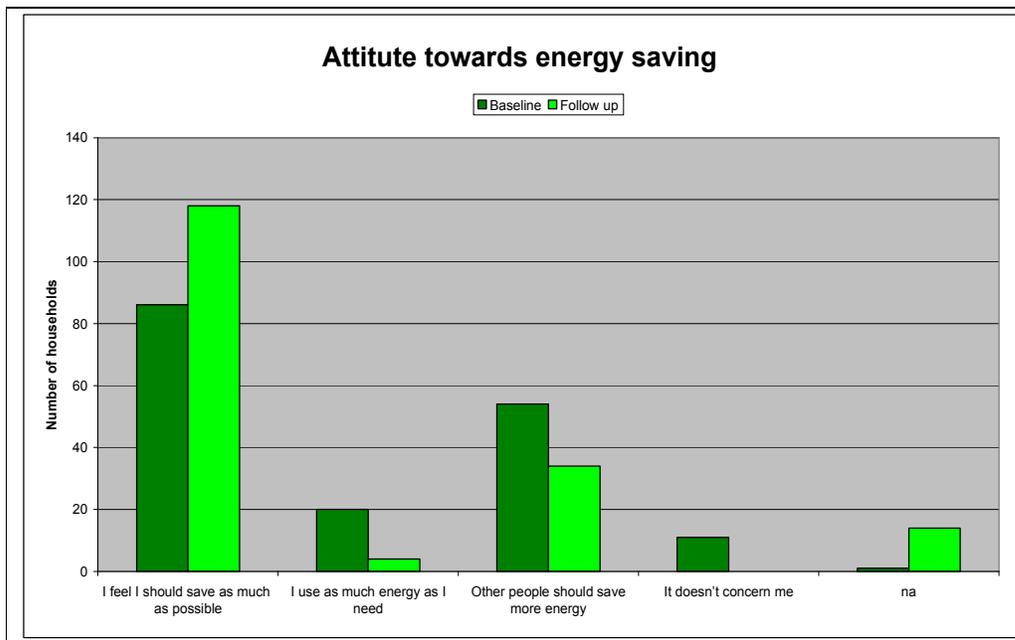


Figure 22: Attitude towards energy saving (Comparison)

4.4. Financial Capital

The influence of the NMBM Solar Water Heater Pilot Project on the financial capital of the affected households can theoretically be observed through looking at the

income and expenditure savings of a household. Employment generates additional income and fights income poverty where unemployment was the norm.

In Zanemvula six men have been temporarily hired for helping out with the installations. In the sample group of the follow-up survey there were three households that each had one member working on the project. Additional income could have been generated through small business development stimulated by the solar water heater installation. None of the households reported selling hot water or have started or supported any other kind of income generating activity. The 18 enumerators have each received R15 per household interview and the person working in the maintenance and complaints office receives a monthly salary.

The expenditure data around electricity, water and fuel for household heating show massive inconsistencies and thus do not qualify for any analysis. Many factors contribute to this and could be possible explanations for the low quality of the data. First of all, this report looked at expenditure in the winter months. The installation of solar water heaters in the first houses has mostly been done in the months of April and May. Subsequently, the follow-up survey was conducted in September - three, in some cases four, months later. As the households had then lived mostly in winter with the technology and never in summer, winter has been chosen as the reference season for the follow-up survey. The baseline survey, however, was conducted in March and April, at a time when households might not have remembered their expenditure from the previous winter months all that well. Expenditures given in the baseline survey might, as a result of that, be less accurate than the expenditures reported in the follow-up survey. As a second quality influencing factor, the recent dates of moving into the houses must be considered. The houses in Zanemvula have mostly been completed in the last 12 months. Thus families have not been living in them for long and many may not even have experienced a winter in these particular houses. Additional changes might have occurred in that, while moving houses and locations, household members might have changed. The data from the follow-up survey are more accurate, which suggests that mentioned concerns might be true, but still do not allow a comparison with the baseline data to be made.

Another factor contributing to the financial capital of the beneficiaries is the fact that the technology and its installation was paid for by the Nelson Mandela Bay Municipality. It is still being decided whether maintenance of the technology, after the first year, will be paid for by the municipality or whether households will have to pay for it themselves. If households are required to pay for maintenance themselves, this could result in many systems not being repaired immediately, or ever, depending on the households' financial capacity to deal with the costs of the maintenance. The possibility that reduction of greenhouse gas emissions will take place through the installation of solar water heaters would in this case not be guaranteed.

Ultimately change is desired in order to effect an increase in income generating activities like employment and small business opportunities. The comparison of the data from the two surveys shows very little change. The only positive change shown is that one additional small business has been started. The decline in government grants, remittances, small jobs and employment shown in the data is partly due the fact that fewer households answered this question in the follow-up survey. In general can be said that changes in this field are expected only at the end of the result chain and the time since the installations were made has been too short.

4.5. Physical Capital

The solar water heaters, if owned by the households, add to the physical capital of the households. In the case of the Zanemvula project, the ownership of the systems lies with the households. However, they have been asked by the municipality not to sell or remove the units for the duration of the first year pilot phase of the project.

Next to the solar water heater itself, households might use money saved through less expenditure on electricity and/or fuel for heating to purchase new appliances for private or productive usage.

4.6. Social Capital

In order to contribute to social capital, the networks within the community need to be influenced. The network that has the greatest potential to be influenced by this

project is the network created by the common experience of living with a solar water heater. This network is most likely to be fostered by a particularly positive or negative perception of the group of beneficiaries, by themselves or by the rest of the community.

The survey did not discover any open conflicts in the community around the issue of allocation of the beneficiaries. However, it is likely that there is some resentment against the households that received solar water heaters for free. Every house approved by the municipality at a particular date was considered as a beneficiary. These houses are spread over the total community of Zanemvula, so that some households received solar water heaters, but their neighbours did not. In the follow-up survey, 90 households said that “solar water heaters are wanted very much by others”, 49 said “most are interested” and 19 that “some are interested in getting one”.

4.7. Gender Capital

Gender does not have its own category in the livelihoods approach, which is applied in this report. Although the objectives for the social impact assessment did not specify a gender assessment, one open question regarding differences in changes experienced by men and women was included. It is not possible to draw any further conclusions regarding gender issues in this project from this one question, as it does not cover any issues other than the major changes experienced by men and women. It was included with the intention to collect some experiences and impressions from the community, and start sensitizing the reader to issues of gender and energy interventions.

The question was asked of and for both women and men regardless of the respondent’s sex. However, men did not answer the question regarding the changes for women as often as women did for themselves and vice versa. Consequently, in most cases the question was answered by a woman for women and a man for men.

The changes experienced by women are most often described with the words “it saves me time” (26 households), this implies that water heating for household purposes is mostly a female task in Zanemvula. The next most commonly mentioned changes - “sleep longer, no need to heat water in the morning” (17 households) and “wash with hot water all the time” (13 households) - indicate a division of tasks between men and women. The bathing of children also seems to be a female task, as another major change indicated for women is that with the solar water heater they can “bath the children all the time” (6 households). Answers such as “it helps me keeping the baby healthy” and “I use the warm water for my baby’s bottle” (6 households each) indicate positive changes in terms of stress levels and childrens’ health for both women and children. Six households also spoke about the advantage which comes with the solar water heater of having hot water always available, regardless of the current financial situation in the household. One woman answered “at least no wood collecting anymore”. The fuel usage in her household seems to have shifted from the use of wood to another source of energy for the household’s purposes and particularly for heating water. Linked to energy usage as well was the answer that the solar water heaters brought a “relief for people without energy” (1 household) who would have had to invest especially a lot of time and energy into heating water, like the woman who is happy about not having to collect wood anymore.

The changes for women in the 175 surveyed households have time savings and relief as common topics. All of the changes mentioned are positive changes.

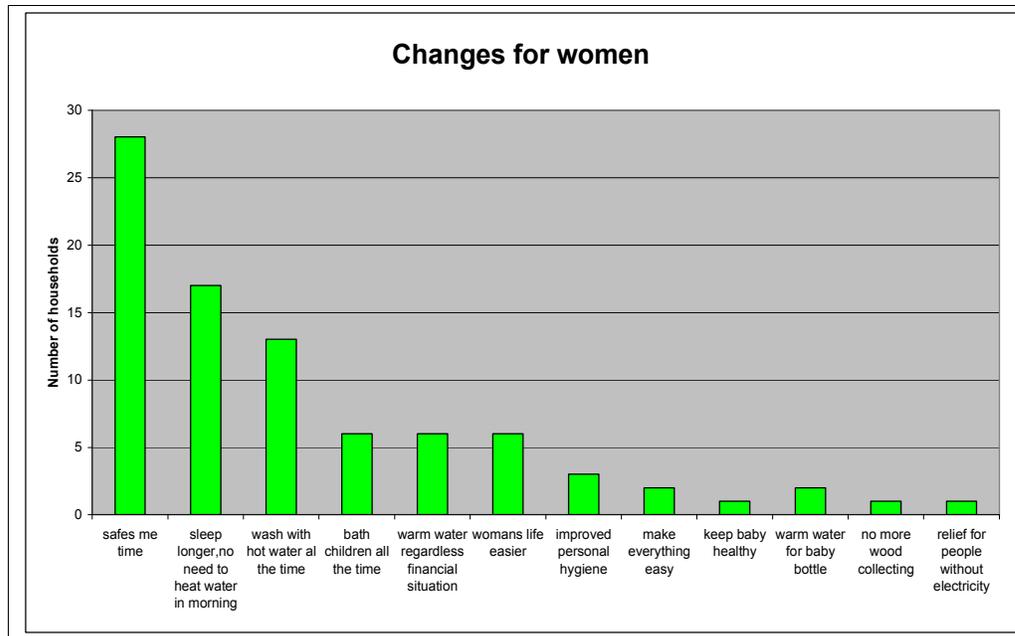


Figure 23: Changes for women (Follow-up)

Looking at the answers given by and for men, personal hygiene and time savings are the two main topics. “No need to wait for someone to prepare bath” (10 households) is the biggest change mentioned for men and by men living with the new technology. This answer again indicates that heating water, in this case for bathing, is a female task in many households. Whether as a result of the gained independence regarding bathing habits, or due to the fact that heating water does not cost any money anymore, the second most common answer is “improved personal hygiene” (8 households). This observation has also been reported in the question regarding the changes for women and the question about positive health impacts. The saved time was brought up by 14 households with answers like “saves me time”, “I can sleep longer” and “no need to heat water in the morning”. Another comment made was that men “can make their own tea now” (3 households). Further answers were “makes everything easier” (2 households) and “wash with hot water all the time” (1 household). In addition, one man told the enumerators that he is “now more likely to help in the household”.

Similar to the answers by and for women, men have reported solely positive changes to their lives. As mentioned before, personal hygiene and time savings have been identified as the most common changes.

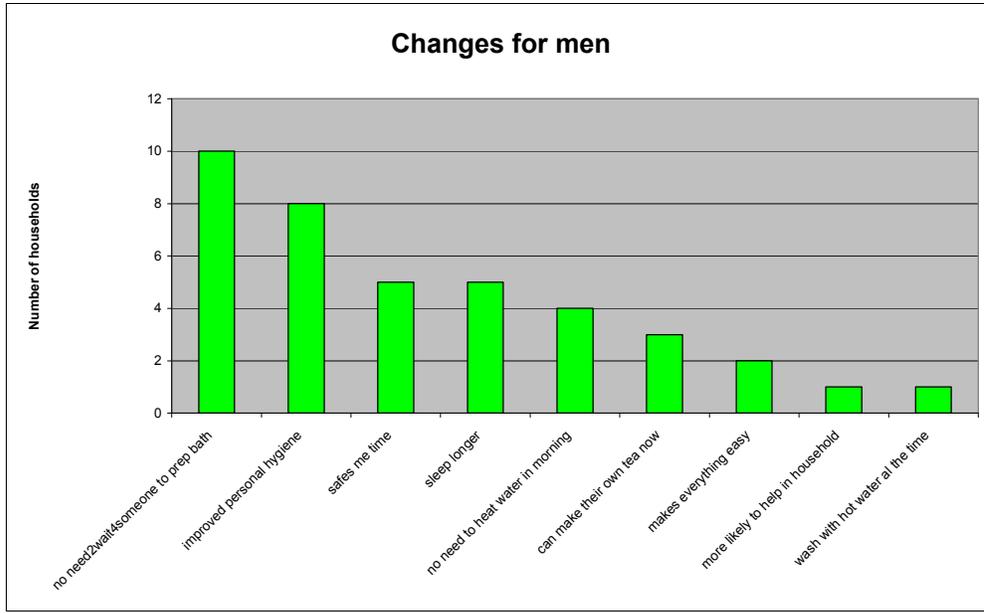


Figure 24: Changes for men (Follow-up)

5. Perception of the project and satisfaction with maintenance

The follow-up survey included a number of questions intended to inform the project management and supplying companies about the participants' perceptions of the project, satisfaction with the maintenance provided and side benefits of the project.

The data from the follow-up survey show that the day of installation of the solar water heaters was, for most households, a positive experience. Of the 175 households surveyed, 137 households stated that they felt very happy and excited on that day.

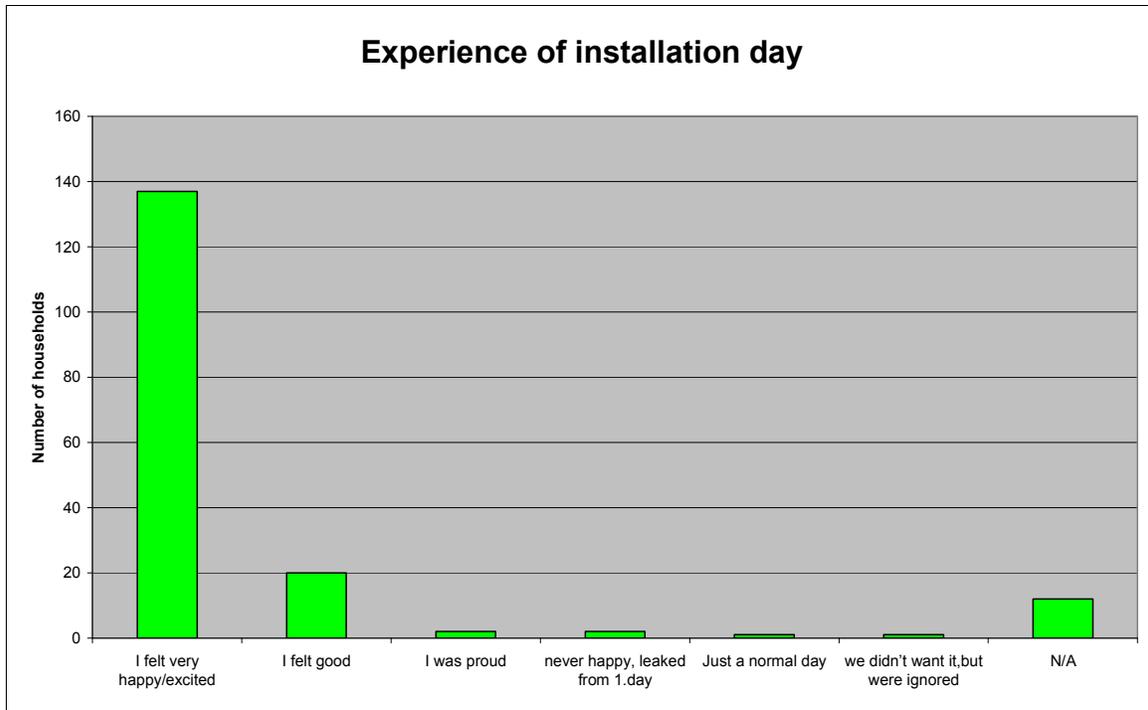


Figure 25: Experience of installation day (Follow-up)

Out of the 175 households surveyed 53% either called for maintenance, or would have called if they knew how to, within the first three months of living with the solar water heaters.

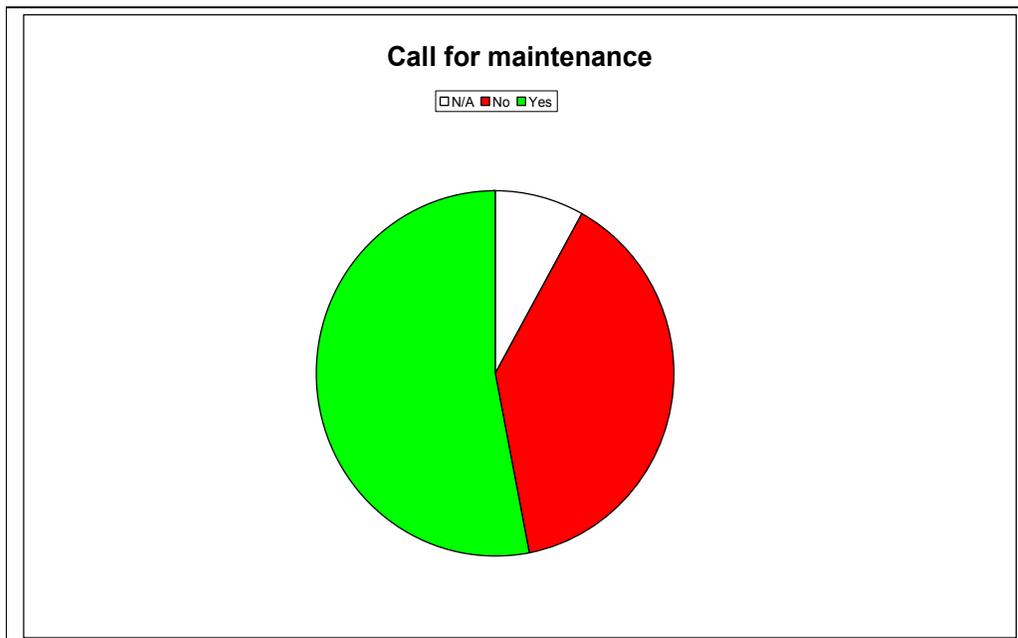


Figure 26: Call for maintenance (Follow-up)

The main problem was leakage (96 households), followed by overflow (6 households) and problems with the tap (5 households). One should note that the difference between overflow and leakage is unclear to many households.

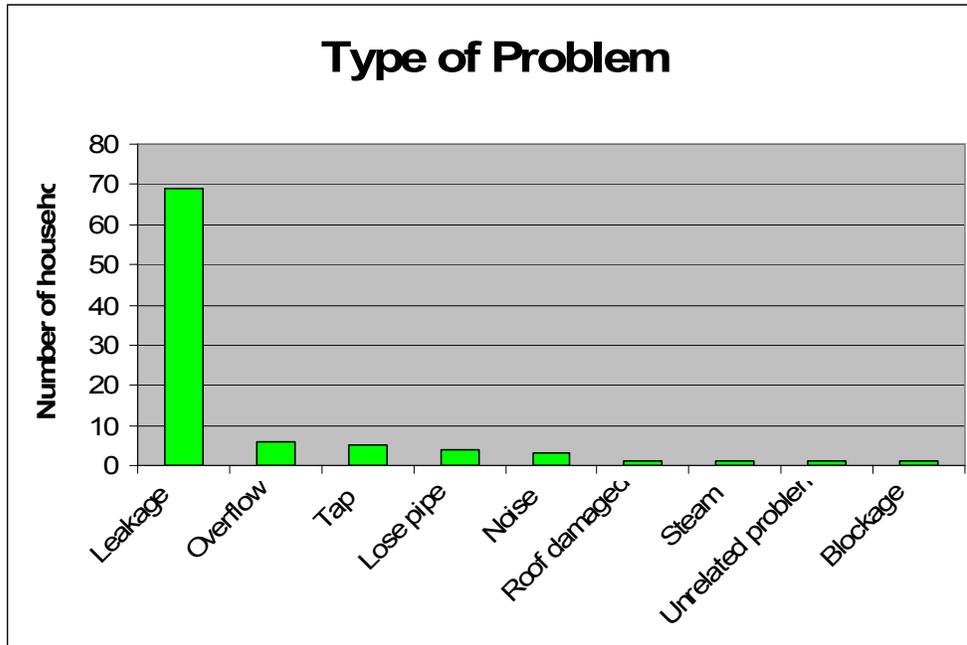


Figure 27: Type of Problem (Follow-up)

Out of the 93 households (53%) that experienced problems, 77 actually called for maintenance and contacted either the suppliers or other project related persons.

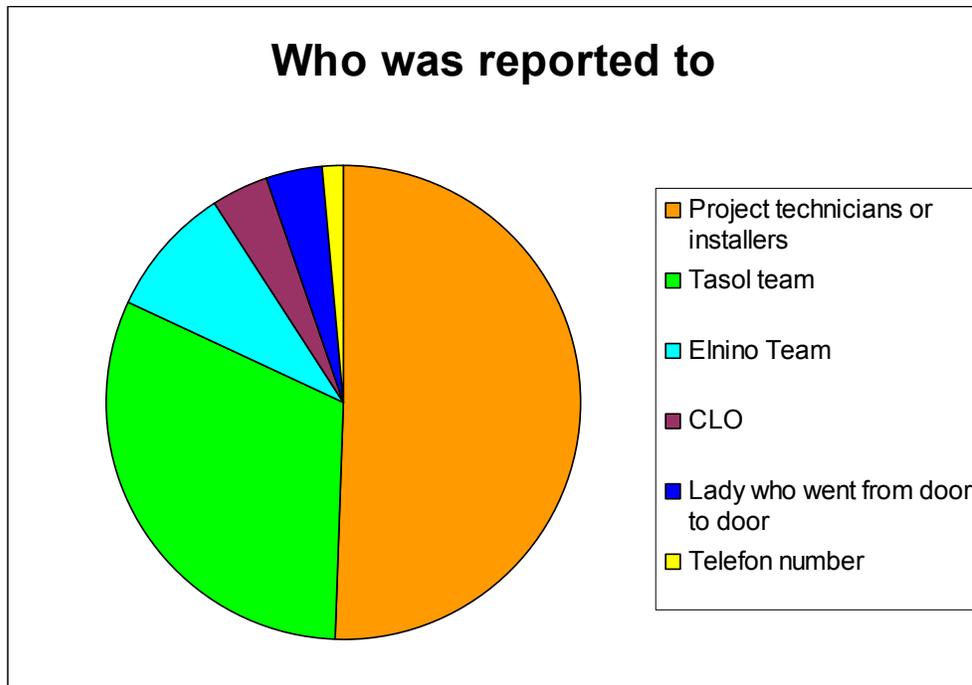


Figure 28: Who was reported to (Follow-up)

In only 45 of the 77 houses (56% of the maintenance calls) was the problem solved in a way and within a time frame that satisfied the home owners. Of the remaining households, 14 complained about the time they had to wait until someone came and fixed the problem and 22 said that the problem was never attended to by the technicians.

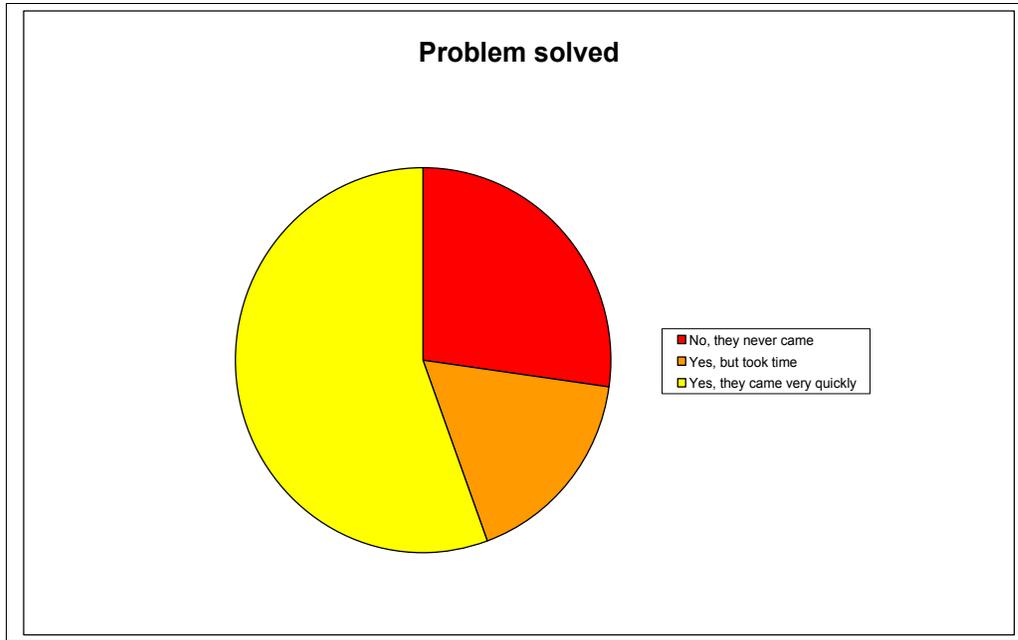


Figure 29: Problem solved (Follow-up)

These experiences, among others, contributed to households' preferences regarding being part of a maintenance system, with 47% indicating that they would like a maintenance system, and 42% preferring to solve technical problems themselves.

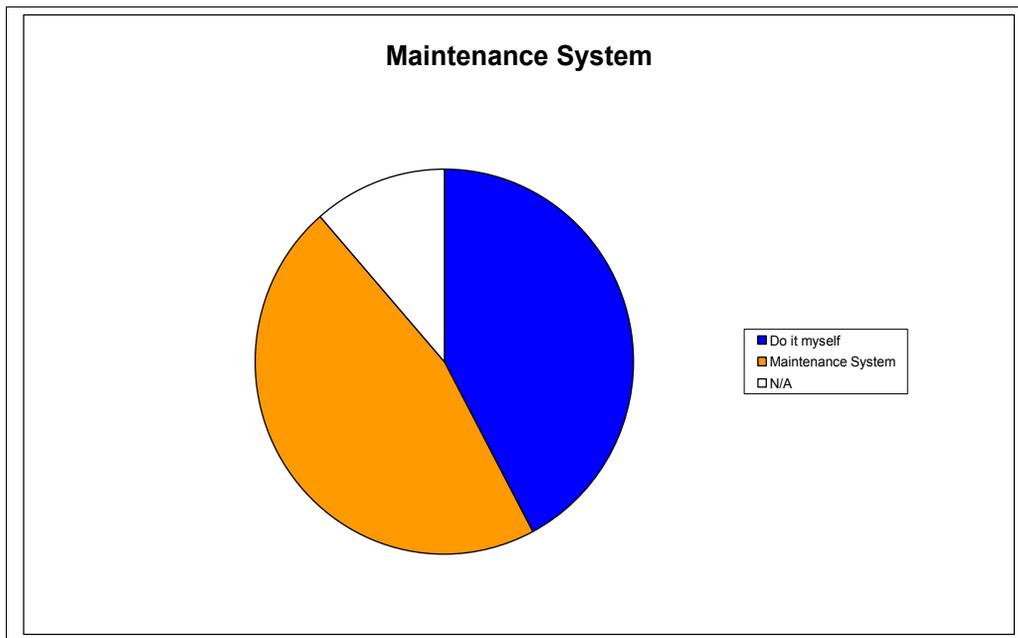


Figure 30: Maintenance System (Follow-up)

The majority of households indicated that they were willing to pay R5 per month to be part of such a maintenance system, with some willing to pay R10 and a few as much as R20. The calculated average amount households said they were willing to pay was R11.60 per month.

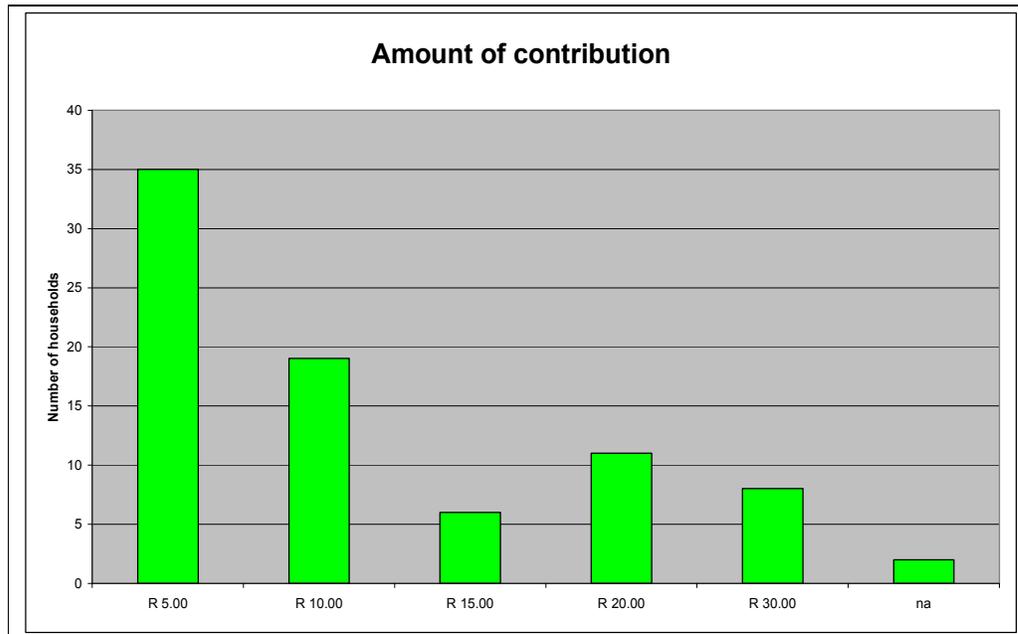


Figure 31: Amount of contribution (Follow-up)

The preferred method of payment for 67% of the households interested in a maintenance system is through rates and taxes, while 37% would rather pay through their electricity pre-paid meter.

The questions regarding the maintenance system caused problems in most of the interviews, due to the fact that the participants believed that they would not have to pay for maintenance at all. Some people refused to answer the questions around a maintenance system completely due to their anger about it. Some of the people who answered both questions added in the comments section that they would be willing to pay the stated amount for fees, but unfortunately are not able to do so for the moment due to a lack of income and employment.

The question about how satisfied households are with the project in general is answered positively. More people are satisfied with it than unsatisfied.



Figure 32: Satisfaction with performance and maintenance (Follow-up)

The question regarding the general perception of the project was answered by the majority of households with “generally satisfied” (52%). Another 19% said people are satisfied but have a few complaints and only 4% have a completely negative perception and chose “not satisfied”.

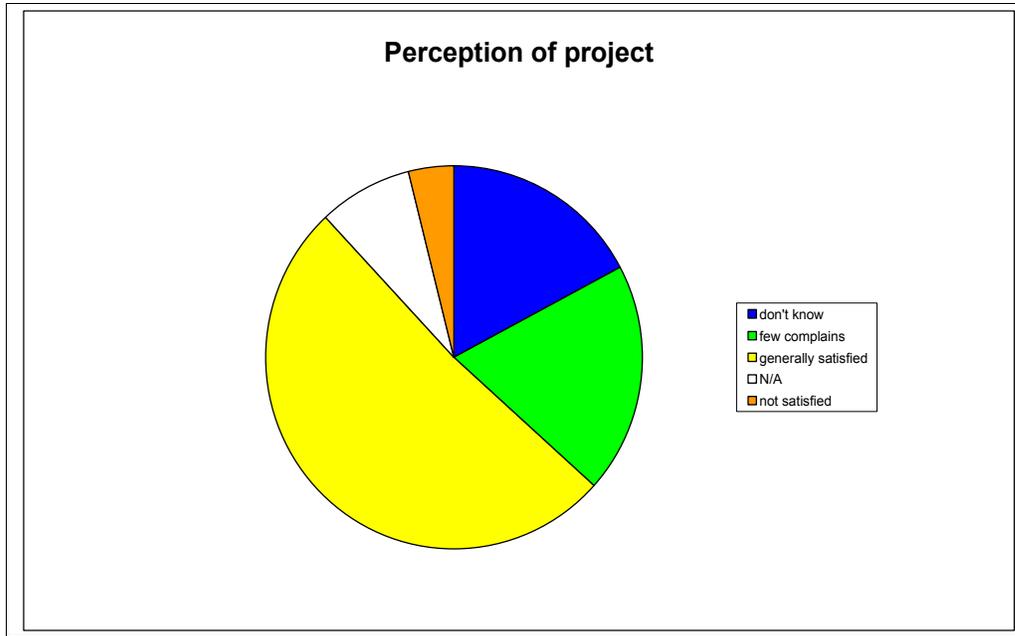


Figure 33: Perception of project (Follow-up)

Of the total, a large number of households changed their opinion when asked why participants are not satisfied and answered that the participants are in fact happy about the project (74 households). As actual reasons leakages (28 households), performance of suppliers (3 households), waste of water (3 households), missing connection to shower (2 households), noise coming from the roof (2 households) and not hot enough water (2 households) were given. One household said that it did not want a solar water heater, but was ignored by the technicians. Other answers were “installations are not finished”, “people always complain” and “tap installed too high on tank” (1 household each).

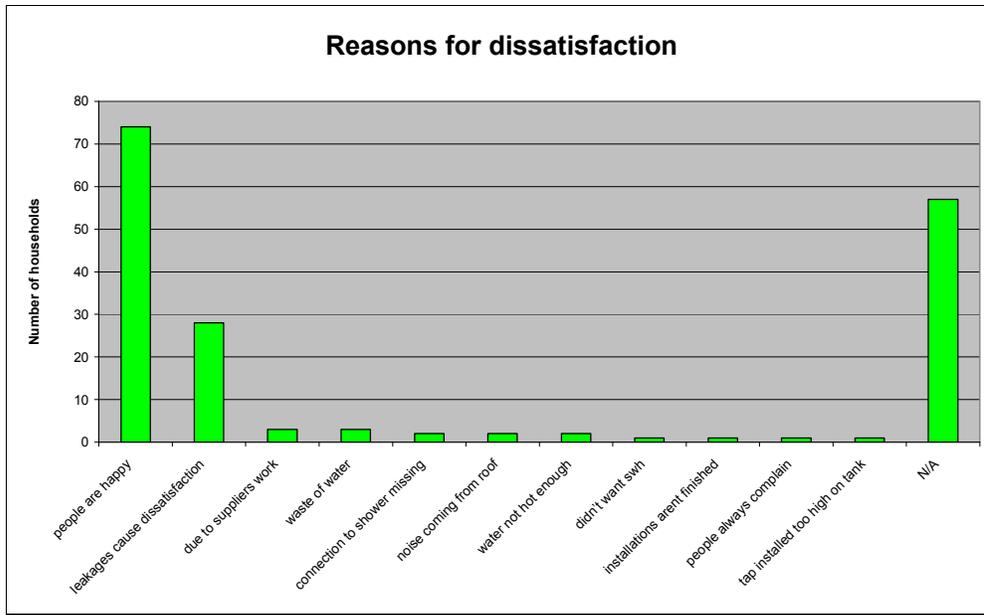


Figure 34: Reasons for dissatisfaction (Follow-up)

One possible explanation for the number of problems reported and complained about could be a lack of education about the new technology. As mentioned previously, the workshop participation - with only 45 of the 175 households surveyed attending - was not great.

In conclusion it can be said that improving the maintenance of the technology has great potential to eliminate the current dissatisfaction, as in most cases this dissatisfaction is linked to the experience of technical problems with the solar water heater. There is much anger and fear around the issue of who will pay for the long-term maintenance of the solar water heaters.

The question as to why the municipality is implementing this project was answered by one household with the words: "Its trap to make us pay lots of money". This answers fits well into the general feedback that came from the enumerators during the survey. Of the households surveyed, 42% decided to fix problems with the solar water heaters themselves rather than pay the municipality to do so. How they will fix these problems and with what money is not clear. With 22% of the respondents not even knowing how to stop water from coming into the geyser, this undertaking is very likely to fail in many cases.

The open question about whether people still have any worries about the safety of the solar water heaters is answered by most of the households with “no” (91 households). Some are still worried about the possibility of damage through storms and high winds (26 households), the risk of theft (6 households), the tubes bursting (5 households), rust damage to the metal in the tank, vandalism damage to the solar water heater or damage by the solar water heater to their houses (3 households each). Other answers were that the technology is “not safe”, “overflow” is worrying, “leakage could damage [the] roof” or “water restrictions could damage solar water heater” (4 households each). “Solar water heater not up to standard” and “lightning” were other fears mentioned (2 households each).

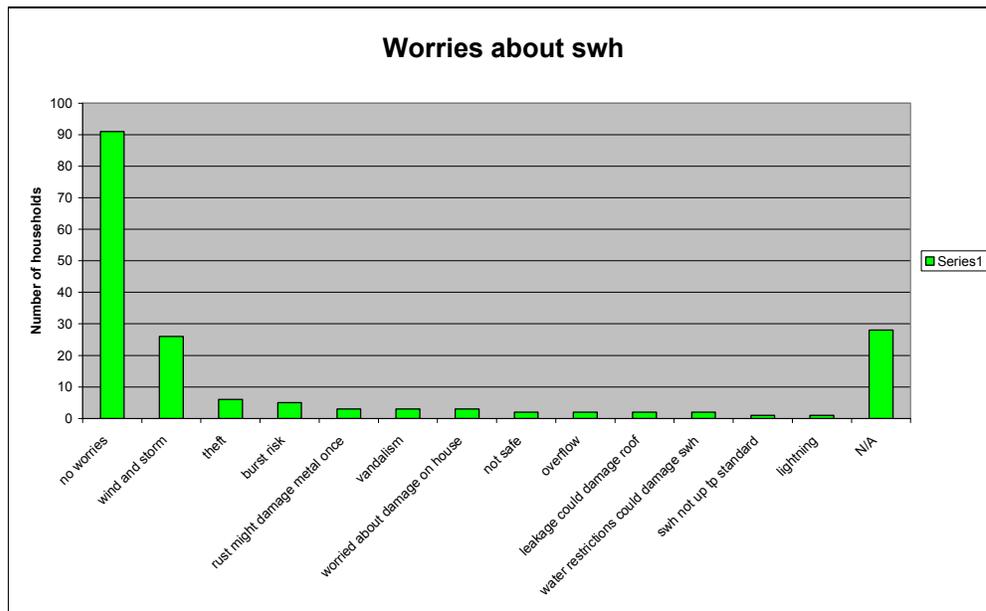


Figure 35: Worries about swh (Follow-up)

In the open question “Why is the municipality implementing this project?” 76 households answered that the municipality wants “improve of situation for people”. More specific answers implied that the respondents thought the intention of the project was to make people save energy and money (35 households) or electricity (10 households). Few knew that the goal of the project is to “reduce CO2 emission” (5 households). Some thought “job creation” was what the municipality intended (3 households). Other answers were “the municipality loves us”, “provide hot water for

free” (2 households each), “municipality is trying out new technology”, and “it’s a trap to make us pay lots of money” (1 household each).

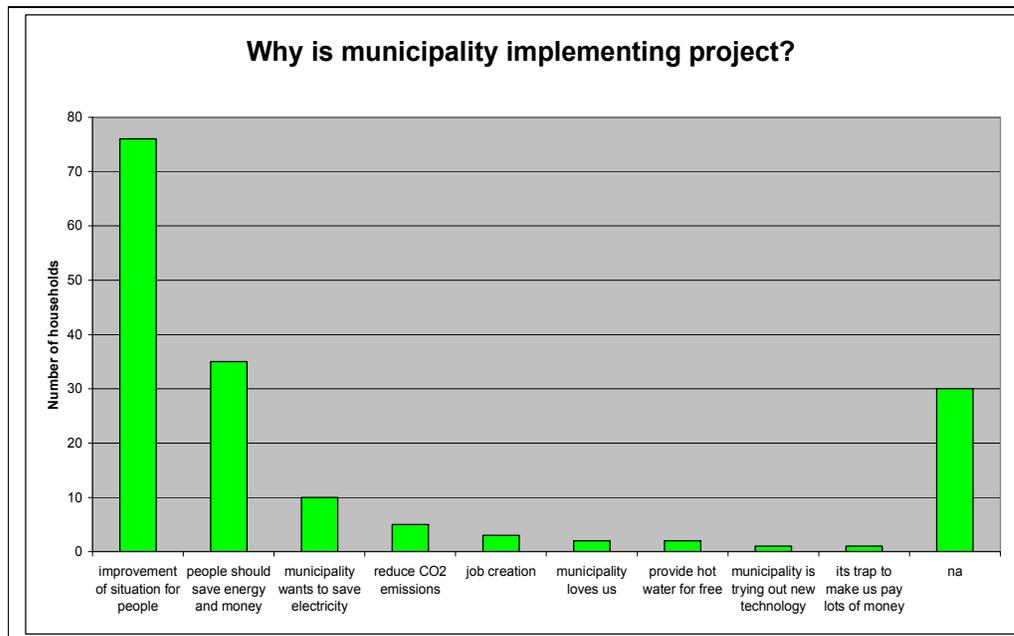


Figure 36: Why municipality implemented project? (Follow-up)

One open question in the questionnaire asked respondents to give the main benefits they thought the project had brought to the community besides the solar water heaters themselves. Many responded that employment had been the main side benefit of the project (77 households). Some believed that the project had speeded up the process of getting houses, electricity and water, and others did not see any benefits other than the solar water heaters (15 households each). Still others said that training, skills and knowledge transfer had come with the project (17 households). “Money savings”(4 households) “better living conditions” (3 households) “increases value of house”, “house looks nice”, “save electricity” and “water meters got speed up” (1 household each), were other answers given.

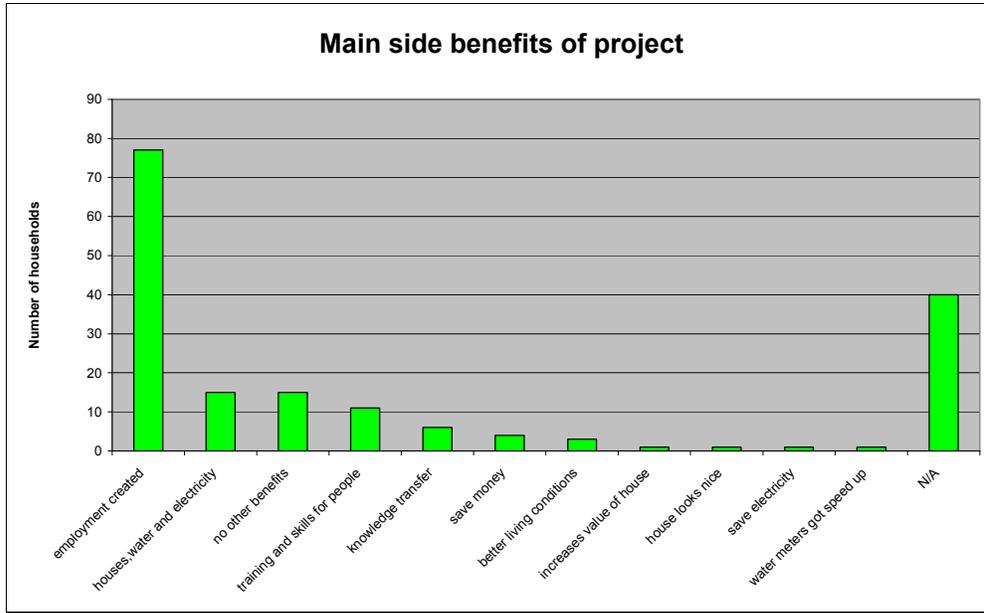


Figure 37: Main side benefits of project (Follow-up)

6. Discussion

The fact that many households had only recently moved into the newly built houses, and that some households received electricity and water for the first time during the three months between the baseline and follow-up surveys, limits the ability of this report to make definitive findings. Additional constraints were the inconsistencies in the data when it came to water, electricity and fuel expenditure and the limited number of houses to choose from for the follow-up survey (due to the small number of completed solar water heater installations at that time). Consequently, the results presented in this report are neither representative of the whole community, nor do they provide a clear picture about expenditure savings of households due to the solar water heaters. The installations have not led to any open conflicts in the community and the general perception of the project is positive.

However, significant changes have occurred among the surveyed households in terms of fuels used. This change is not only due to the solar water heaters, but a result of the changes in the community since the baseline survey was conducted. Thus even greater changes could be expected in the rest of the community through the process of receiving water, electricity and solar water heaters.

7. Conclusion

The results compiled from the two surveys indicate that the installation of solar water heaters has brought positive changes to the 175 households from the community of Zanemvula involved in the follow-up survey. As well as the renewable energy technology, basic services in the form of electricity and water connections have also been provided. All three interventions have arrived at different times and in a few cases households that have already received solar water heaters are still waiting for either water or electricity connections. Most of the households involved in the follow-up survey had municipal electricity and water connections before the solar water heater roll-out started while others were connected to their neighbours. A common characteristic is that every household that has received a solar water heater has a water connection of some kind.

To identify which changes are caused by each of the three interventions is not merely challenging but almost impossible. The direct cause of some changes, like changes in patterns around water heating for example, is easy to identify. The direct cause of other changes, like changes in expenditure for services or consumption of fuel, is more difficult to separate from other influences. The potential of the quantitative data to identify the cause of the changes measured is limited in this project. For this reason the *Most Significant Change Story* tool was applied and two stories from people involved in the project are published in the beginning of this report.

It is clear that energy poverty has declined and the households that have received solar water heaters are using other means to heat water less frequently throughout the day. Some temporary employment has been created and in one case this employment has been transformed into a part-time position. Income poverty has definitely improved for these households during the time that this employment has been made available. All the sample group households own a renewable energy technology, which they received for free. Health seems to have improved little overall, though personal hygiene has improved, especially for men. Women welcome the “ease” which comes with the availability of hot water from the solar water heaters and enjoy more sleep in the mornings.

8. Recommendations

Regarding the difficulties experienced in analysing the quantitative data, it would be advisable to emphasise the collection of qualitative information in the next assessment. Missing data, due to the lack of electricity and water connections at the time of the baseline survey, could be a great chance for further research into some of the comments made by the households.

Issues around personal hygiene, comfort, stress and gender could be worth looking into. The recommendation is to spend some time collecting qualitative information and after the analysis of that data, consider further quantitative data collection in order to quantify the results. In addition to an open qualitative approach, it would be advisable to conduct a comprehensive gender analysis of the solar water heater intervention, as the results in this report indicate considerable differences in the use and benefits of the hot water service. It is thus recommended to leave out the small quantitative survey planned for January 2010 and save that budget in order to conduct above mentioned comprehensive research in March and April 2010. A new proposal shall be written for that work.

Further recommendations are:

- The follow up survey shall compare the perception of the households after summer, to assess the difference in efficiency and overall satisfaction of the households between winter and summer.
- The project managers to take note of the various complaints listed by various households on different issues. These issues can mostly be addressed through the yearlong maintenance program.
- The issue surrounding future payments for a maintenance program should be addressed as this caused confusion and anger among the surveyed households.
- The influence that education on the solar water heater technology has with regards to the household's perception of the technology and project should be looked at in more detail as well.

It is recommended that the project managers of the Nelson Mandela Bay Municipality make use of this report to inform them of shortcomings, but also to assist them with future decisions.

9. References

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