



***Behaviour analysis of households selected
for participation in a load-management pilot
programme***

Compiled by

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Behaviour analysis of households selected for participation in a load management pilot programme

1 Background

This report stems from an initiative by Eskom Research to investigate the viability of new technology that will allow the power utility to limit the power supply to individual households during peak and off-peak time periods, rather than resorting to all-out blackouts. It is believed that the new technology will enable residential consumers to control their energy consumption in order to assist Eskom the better to manage the load on the national grid during high-demand periods. In a first step to assess the effectiveness of the Utility Load Manager (ULM), Eskom Research initiated a pilot programme in Gauteng Province.

The Centre for Development Support (CDS) at the University of the Free State was commissioned to monitor both the experiences and the behavioural change of the pilot population regarding the installation of a ULM in selected households. This document mainly reports on the findings of two primary surveys – briefly referred to as the benchmark and the monitor surveys - among a sample of residential electricity consumers who participated in the said pilot programme. The surveys were built on a similar survey conducted in April 2008 among a limited sample of electricity consumers as part of the field trial of the load-limiter device and display. During the 2009-2010 roll-out of the load management pilot programme, a third (secondary) survey was also conducted amongst a sample of non-participants, i.e. households who, though invited to participate in the programme, declined to do so. The purpose of this survey was to capture and document the reasons for failing to take part in the pilot programme. The findings of this survey are reported in Section 5 of this report.

The two primary surveys set the following aims: (i) to profile the energy-consumption patterns of the selected households to serve as a benchmark for tracking future behavioural change in this regard; (ii) to document the experience and perceptions of the selected households following the installation and use of the ULM; (iii) to determine the confidence levels amongst the selected households pertaining to their adaptation to, and usage of, the display; (iv) to identify any significant correlations between the cultural and socio-economic characteristics of the sampled population, on the one hand, and their adaptation to and usage of the display, on the other; and, (v) to identify any requirements in respect of education that might be necessary to strengthen the abilities of electricity consumers to operate the device.

2 Methodology

The primary target group consisted of higher-consumption Eskom clients in the private household sector, as represented by the Living Standards Measures (LSM) groups 7-10. The LSM is a tool to classify the South African Market, and that groups people according to objective criteria, such as whether they are urbanised and have access to, or own major appliances, technology and household durables. A sample that targets households in the metropolitan areas of provinces, such as Gauteng and Western Cape, will be representative of high-consumption households in South Africa, as consumption levels (and household income) are considerably higher in urban than in rural areas. Although income is not used to determine a person's LSM, it does often determine the ability of a person (or household) to gain access to the variables used for the purposes of LSM classification. For the purposes of this study, spatial differentiation in terms of residential area has been used as a proxy indicator of income and socio-economic status (the latter being indicative of access to the range of durables and appliances). In the design of the questionnaire, household income has therefore been used as an independent variable to control for socio-economic status and LSM classification.

All the households for the pilot programme were recruited on a voluntary basis in the residential areas of Lonehill, Paulshoff and Fourways in Gauteng. Data were collected by means of three structured questionnaires: A first questionnaire (used in the benchmark survey) was designed to collect data prior to the installation of the device in order to reflect and benchmark the status quo pertaining to electricity consumption and energy-related behavioural patterns; a second questionnaire (used in the monitor survey) was employed to assess the experiences and perceptions of the sample a few days subsequent to exposure to the device, while the third questionnaire was employed in the non-participant survey to determine the reasons for declining the invitation to join the pilot programme. Questionnaires were made available in Afrikaans, English, isiZulu, and Setswana, and respondents could choose to be interviewed in the language of their preference. Data were collected by means of telephonic interviews. Twelve field operators, capable of conversing fluently in the aforementioned languages, conducted telephonic interviews from the offices of the CDS in Bloemfontein. All interviews were conducted with the person responsible for handling the process of the device in each household. The first round of some 489 interviews (the benchmark study) was conducted between 7 July and 30 September 2009. The reasons for not conducting interviews with all 503 volunteers were that they could not be reached or were overseas at the time of the interviews. A second round of interviews, involving an

additional 192 households, was completed during March 2010. A total of 173 interviews were successfully completed during this round. Responses captured during the two rounds of the benchmark survey were pooled and are presented as a single profile. The same approach was followed in respect of the monitor survey.

The first group of volunteering households was exposed to the load-limiting period between 26 October and 6 November 2009. Only 192 devices were activated during that period, and therefore the monitor survey was only administered to 192 respondents. The telephonic interviews were conducted between 9 and 12 November 2009, and a total of 184 interviews were completed and aligned with the corresponding records of the benchmark survey. The load-limiting period for the second group of households ran between 16 and 30 March 2010 and a total of 64 interviews were completed during this round, bringing the grand total for the two monitor surveys to 246 households.

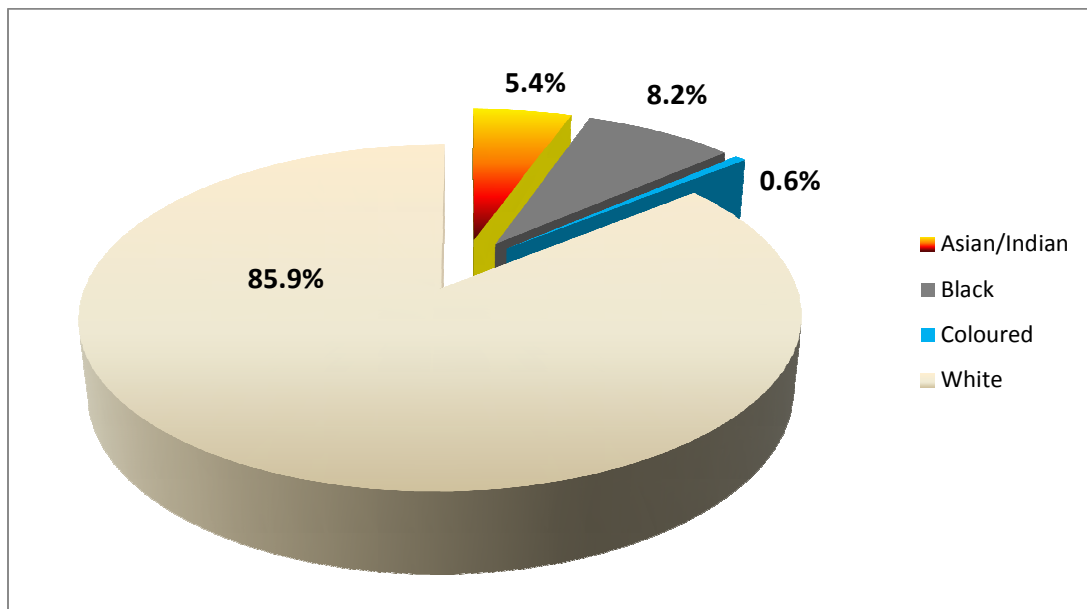
2.1 About the sample

This section focuses on the sample for the benchmark and the monitor surveys only; the sample for non-participating households is discussed under Section 5 of this report.

Although LSM classifications ignore race as a factor in determining the LSM group of a person, the 10 LSM groups nevertheless show strong correlations with race: LSM groups 1-6 are dominated by the black population, while the majority of groups 9 and 10 consist of large proportions of white households – reminiscent of the previous political and economic dispensation in the country. Since the different population groups always display significant differences in behaviour and perceptions, any sample that wishes to extrapolate the findings to specific LSM groups should therefore strive to resemble the actual biographical compilation of the target groups. The sample for the pilot programme, however, although targeting households in the upper LSM levels, is over-representative of white households, while blacks and coloureds are under-represented in terms of their real national proportions in the LSM 7-10 groups. In fact, the current profile is more representative of LSM 10 than LSM 7-10 (whites comprised 69.5% of LSM 10, but constituted almost 86% or 305 of the 355 households of the survey sample). Black households – including Asian and coloured households – comprised only 50 of the 355 households. Although caution should therefore be taken in generalising the findings, it is important to bear in mind the fact that very little variation in the data occurred between the first round of the benchmark survey (with very few black households having been included in the sample), and the second round of the survey, when the proportion of black households was significantly inflated. This observation

suggests that there might probably not be any significant differences in terms of experience and perceptions of the device – something that strengthens the potential extrapolation of the findings to all higher LSM groups in the country. Given the small total of the number of black households in the sample, the researchers, however, did not run any bi-variable statistical tests on the data.

Population group of households (sample)



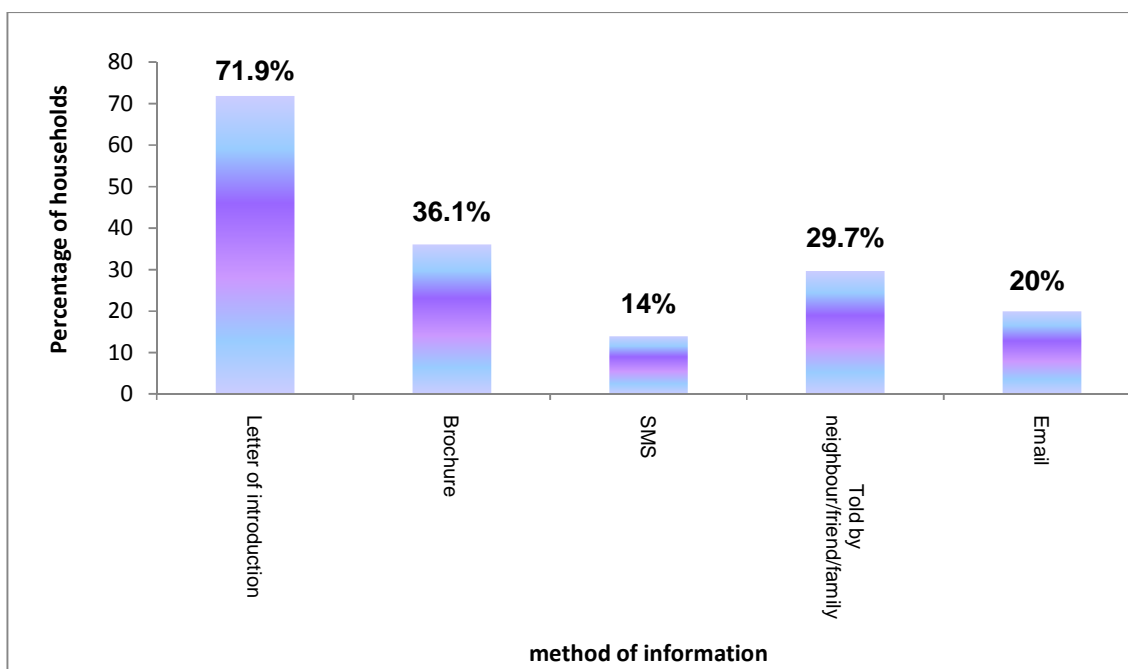
Since more than one-third of all LSM 7-10 households in South Africa are based in the metropolitan areas of Gauteng, the sample does give a snapshot of the *probable* consumer and behavioural patterns of upper-LSM groups in the country with regard to various aspects pertaining to the ULM. Yet in order for an unqualified extrapolation to be made, a larger sample - one that reflects more substantial proportions of black and coloured households - will be required. The study nevertheless provides a baseline or platform not only for the refinement of the technology, but also for the identification of segments of consumer behaviour and perceptions that may require intervention in the form of a targeted education and marketing campaign. Because the sample for black households was smaller than initially anticipated, the findings are only presented at the descriptive level, and in question and data format (Questions and question numbers correlate with those in the questionnaires).

3 Findings

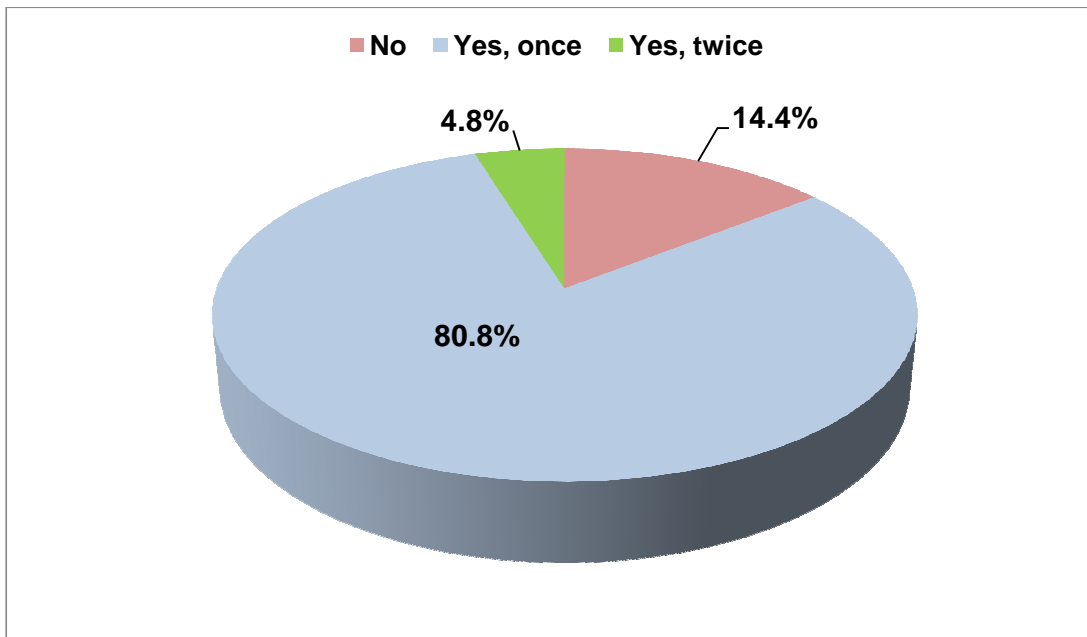
3.1 Findings of the baseline survey

In rolling out any intervention strategy, including this load management pilot programme, efficient communication and awareness-raising are both of pivotal importance for the successful implementation of the project. More than two-thirds (71.9%) of the households in the sample reported that they were initially informed by means of a Letter of Introduction, while 36.1% received a brochure, and 29.7% were told by a neighbour, friend or family member. Smaller proportions were also electronically informed by SMS and email.

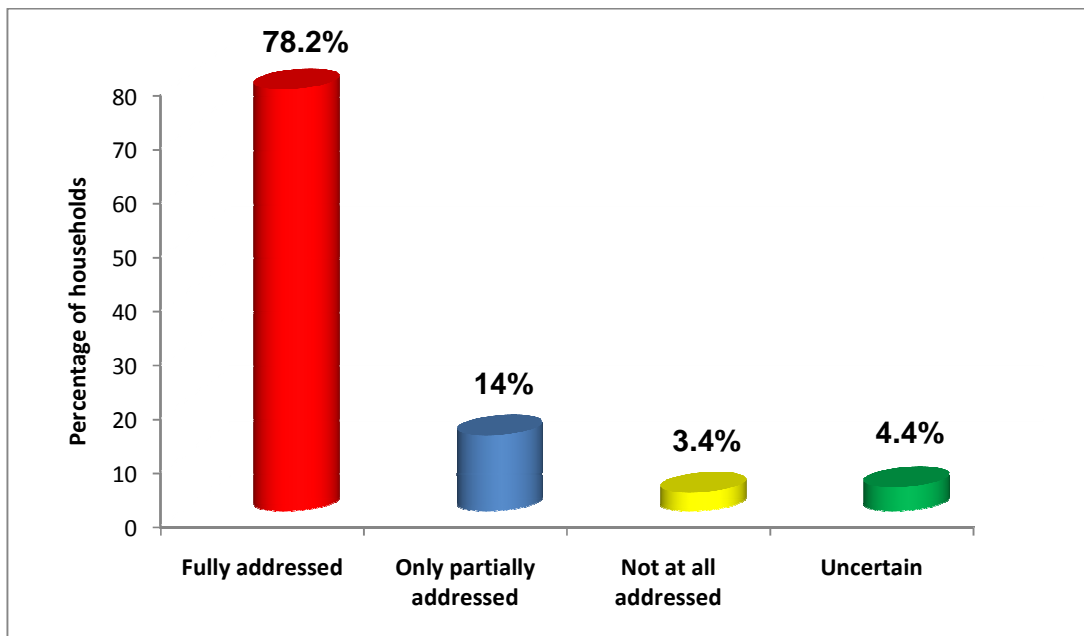
Q1 How were you initially informed about this pilot project?



Q2 Did you attend any of the information meetings on the pilot project?

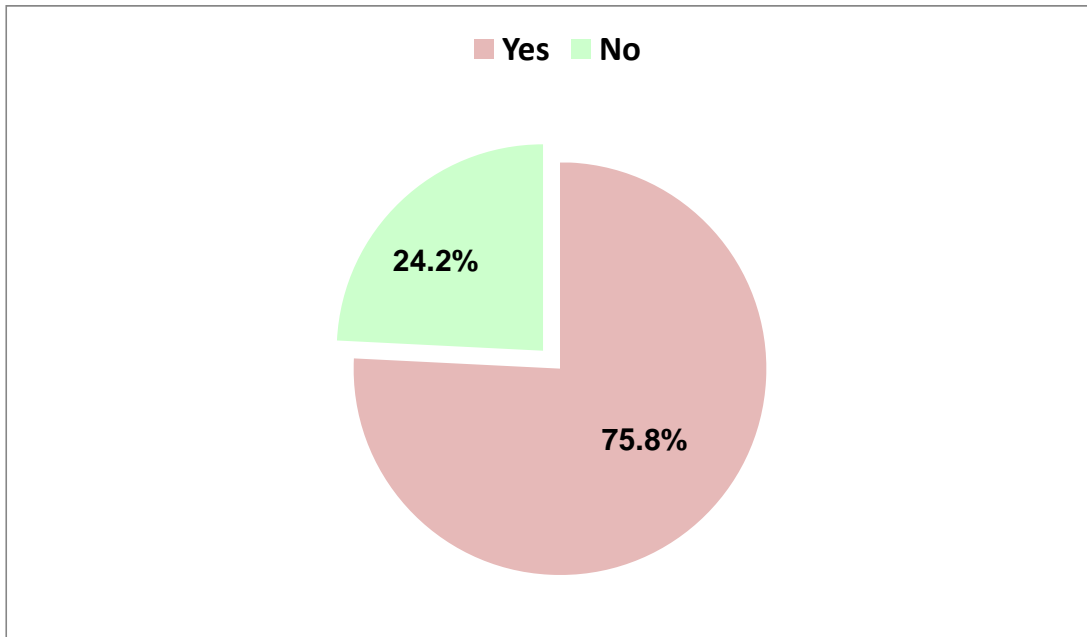


Q3 To what extent were your concerns about the pilot project addressed at the information meeting?

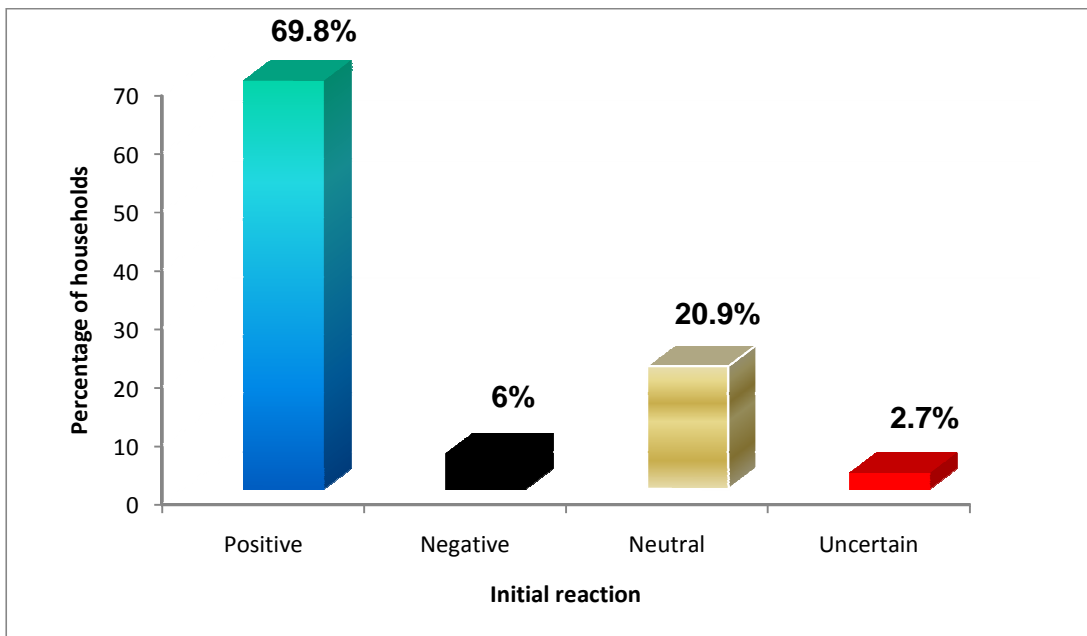


A large number of respondents (80.8%) indicated that they had attended information meetings on the pilot project (Q2). Of those clients who had attended the information sessions, almost 8 out of 10 (78.2%) indicated that their concerns had been fully addressed.

Q4 Did you tell any of your friends or family members about this pilot project?



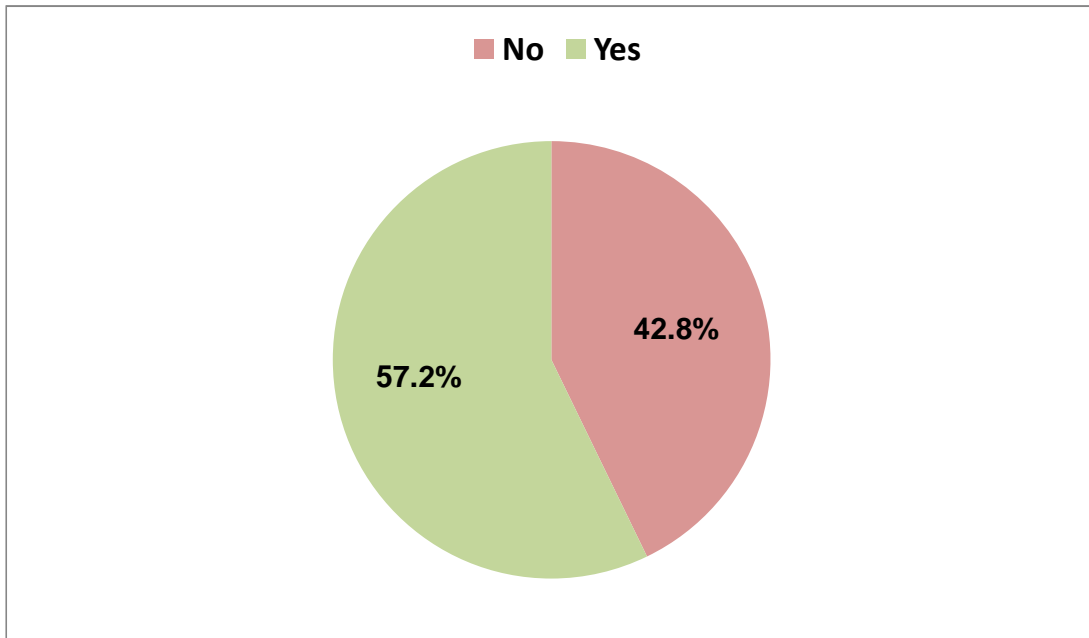
Q4.1 How would you describe their initial reaction to this project?



That almost 8 out of 10 (75.8%) participants told family and friends about the programme, is an indication of people's positive attitude towards the project (Q4). Almost 70% of the

participants indicated that their family and friends had reacted positively to this project (Q4.1).

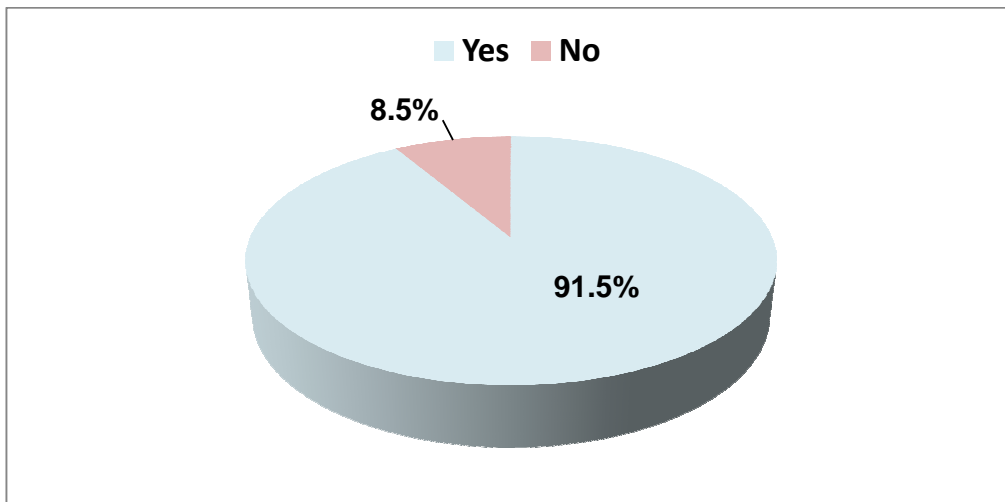
Q5 Do you know where to find additional information on the pilot project?



Q5.1 Where would you source additional information on the project?

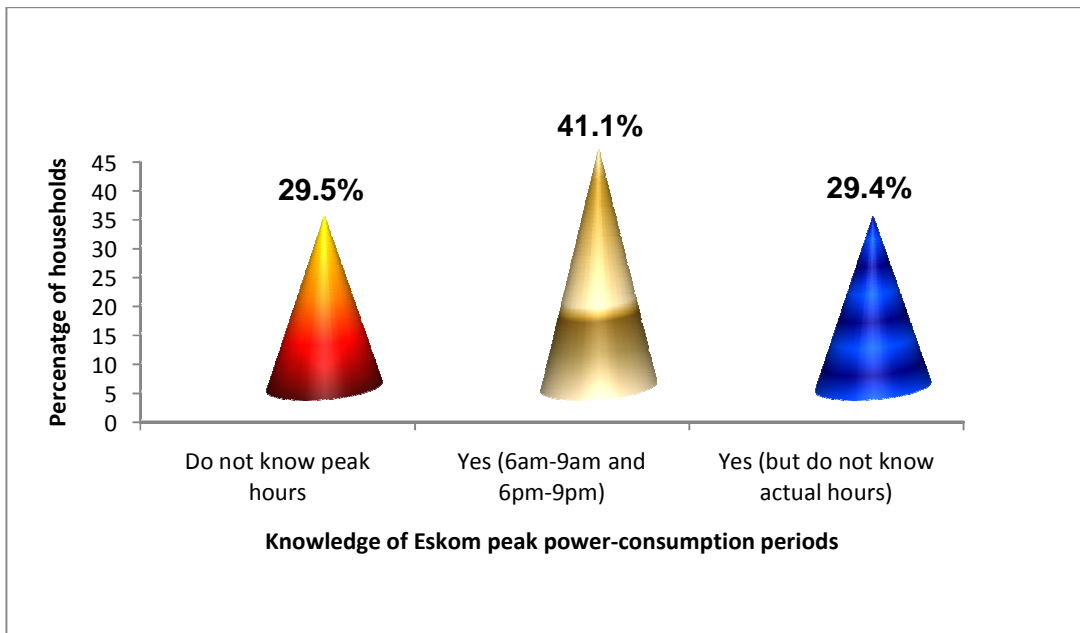
Asked whether they knew where to source additional information on the project, almost half of the clients returned negative responses (42.8%). Of the 57.2% who indicated that they knew where to source additional information, the vast majority referred to the website (62.6%), while smaller proportions mentioned the contact centre (31.5%), brochures (14.8%) and friends/family (3%).

Q5.2 Do you currently involve your household members in any way in saving on electricity consumption?

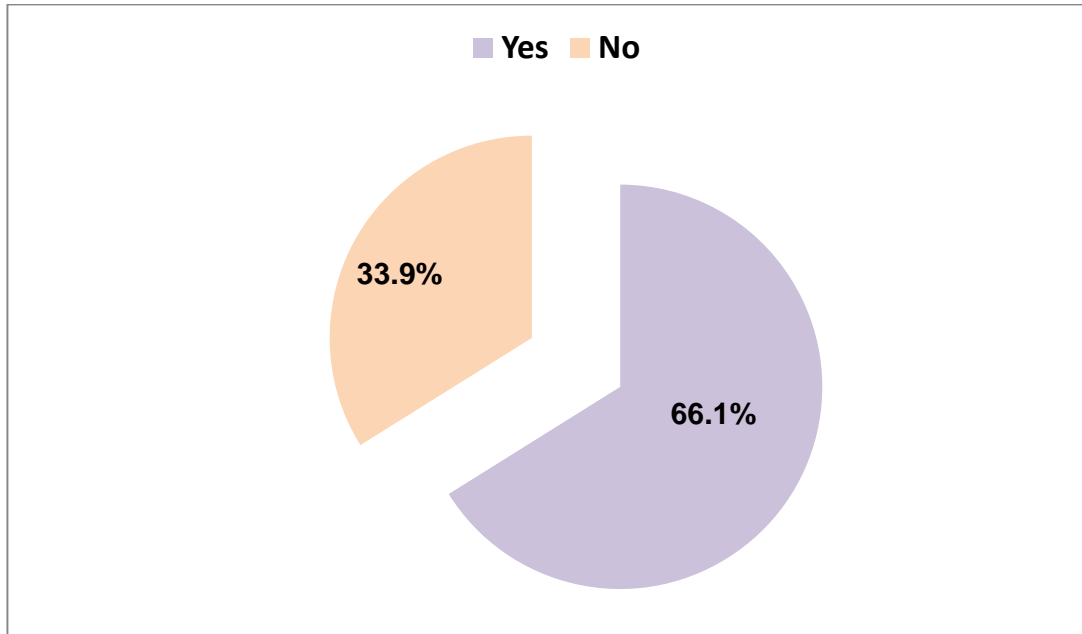


More than 9 respondents out of 10 were at the time involving other household members in saving on electricity consumption (Q5.2). This claim, however, does not confirm the profile of consumer behaviour that emerged specifically from questions 8 and 9.

Q6 Do you know which hours of the day are regarded as the Eskom peak power-consumption periods?



Q7 Has your household ever cut back on your power consumption during Eskom peak hours by switching off some electrical devices?



Less than half of the pilot group (41.1%) could correctly identify Eskom's peak-hour consumption periods (Q6), while 66.1% of the respondents attempted to cut back on household power consumption by switching off electrical devices during Eskom peak hours (Q7).

Q8 & Q9 How often do you leave the following equipment on when you are not in the room or not using it?

Equipment	Always (%)	Sometimes (%)	Never (%)	Total
Lights	73.8	24.5	1.7	100
TV set	22.2	30.7	47.2	100
Radio/hi-fi	18.4	19.0	62.7	100
Video/DVD	22.4	14.1	63.5	100
PC/laptop	27.5	23.4	49.1	100
Cellphone charger	29.1	16.2	54.7	100
Other battery-charging devices (camera, shaver, etc)*	14.4	5.9	54.2	100

*The percentages in this row do not add up to 100 because not all respondents listed additional items in this category.

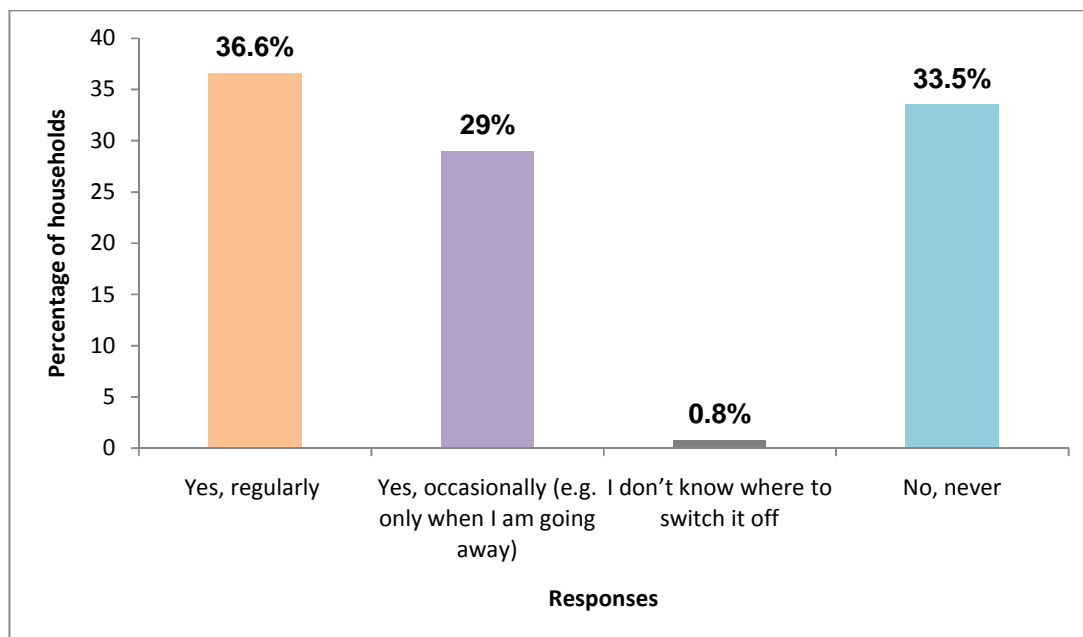
The vast majority of respondents (73.8%) indicated that they never switched off the lights when leaving a room. Apart from the lights, smaller proportions of respondents indicated leaving other equipment on when not in the room or when not using it (Q9). Almost a third of the respondents reported leaving their cellphone charger on, while almost a quarter (22.4%) indicated that they always left their television and video/DVD on when they were not in the room. It thus seems that there is still plenty of room to mobilise consumers to engage more constructively in electricity-saving practices at the household level. This profile of “reckless consumption” also challenges the claim by 91.5% of the respondents (Q5.2) that they involve their household members in saving on electricity. A similar trend of “limited energy awareness” emerges from questions 10, 11 and 12.

Q10 If you want a cup of coffee just for yourself, how much water would you put into the kettle/pot? Would you:

Statement	N	%
Fill the kettle with just enough water for one cup	193	55.0
Fill the kettle with slightly more water than what is needed immediately	126	35.9
Fill up kettle to the maximum	31	8.8
Never makes coffee/ Housekeeper does it	1	0.3
Total	351	100.0

Although only 8.8% of the respondents indicated that they filled the kettle to its maximum when they needed just one cup of coffee, 35.9% of the respondents filled the kettle with slightly more water than was needed immediately (Q10). This means that in almost half of the cases, the kettle was filled with more water than was actually needed for immediate use.

Q11 Do you ever switch off your geyser?

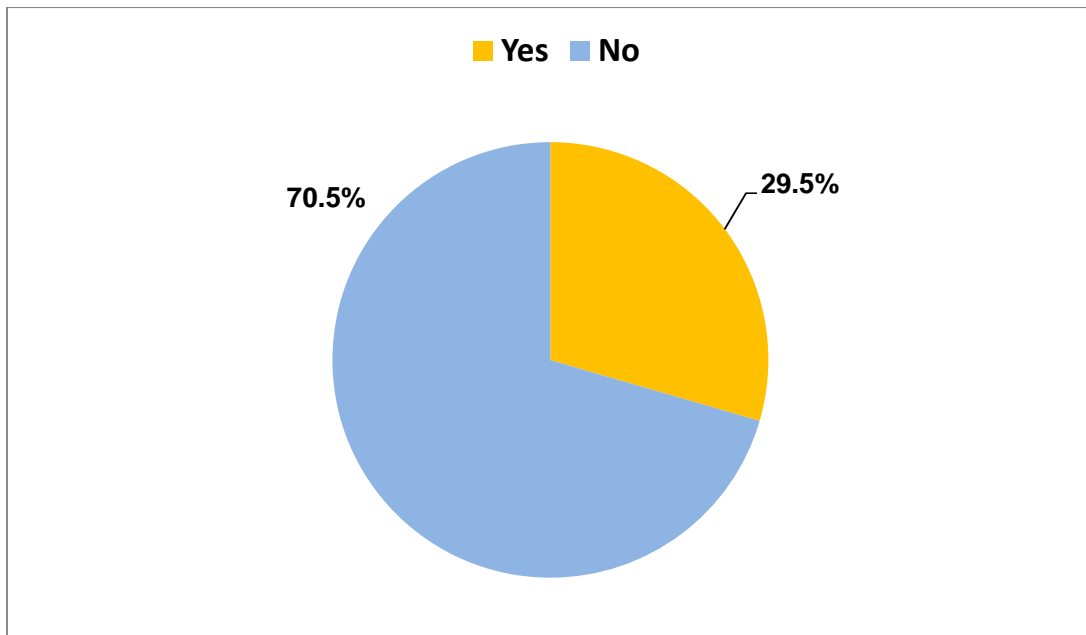


Q11.1 Why do you never switch off your geyser?

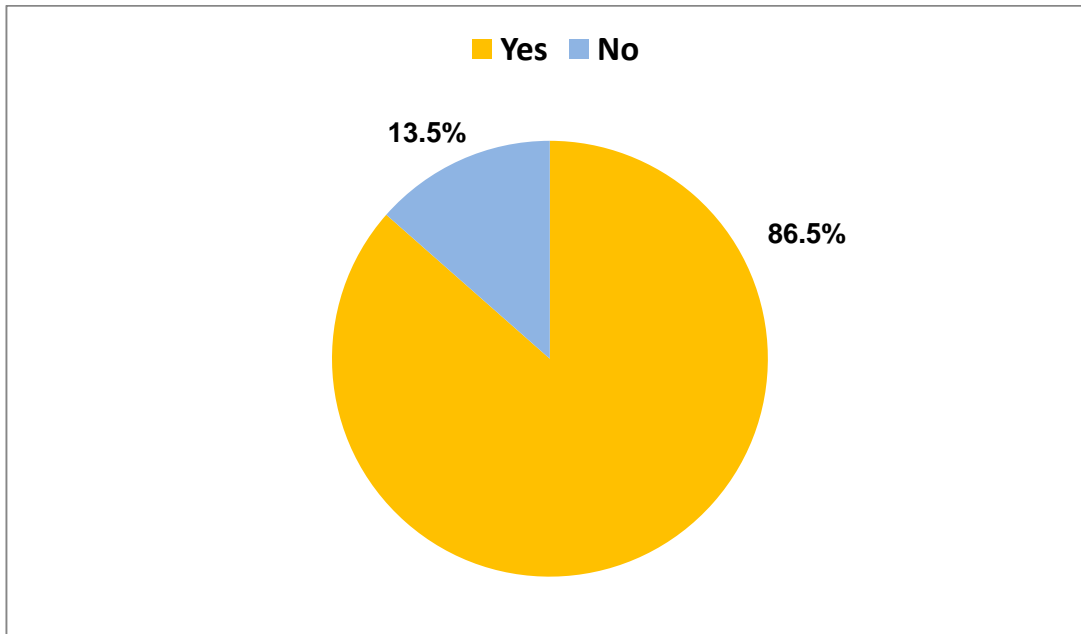
Reason	N	%
Forget to switch it on again	16	14.3
Geyser operates with solar power/gas	5	4.5
Do not think good idea/burn out/ afraid it causes damage	26	23.2
Geyser has timer/switches off automatically	8	7.1
Personal reasons (difficult to get to switch/ inconvenient/keep it on lower temperature)	34	30.4
Tried, but does not make a difference/uses more power	23	20.5
Total	112	100.0

More than a third of the respondents (33.5%) indicated that they never switched off their geysers. It is important, however, to consider the fact that almost 12% of this group had geysers operating with a timer or that they used solar power; switching off the geyser was therefore not considered an option by these households. For the remainder, there was the perception that by switching off the geyser it would actually use more electricity to get warm again, while others pointed at the inconvenience of switching it on/off. Some households were also afraid that continually switching the geyser on/off could damage the appliance (Q11.1). Notwithstanding, a substantial proportion of the households (65.6%) did indeed switch off their geysers - either regularly or occasionally when they went away (Q11).

Q12 Do you use a geyser blanket?



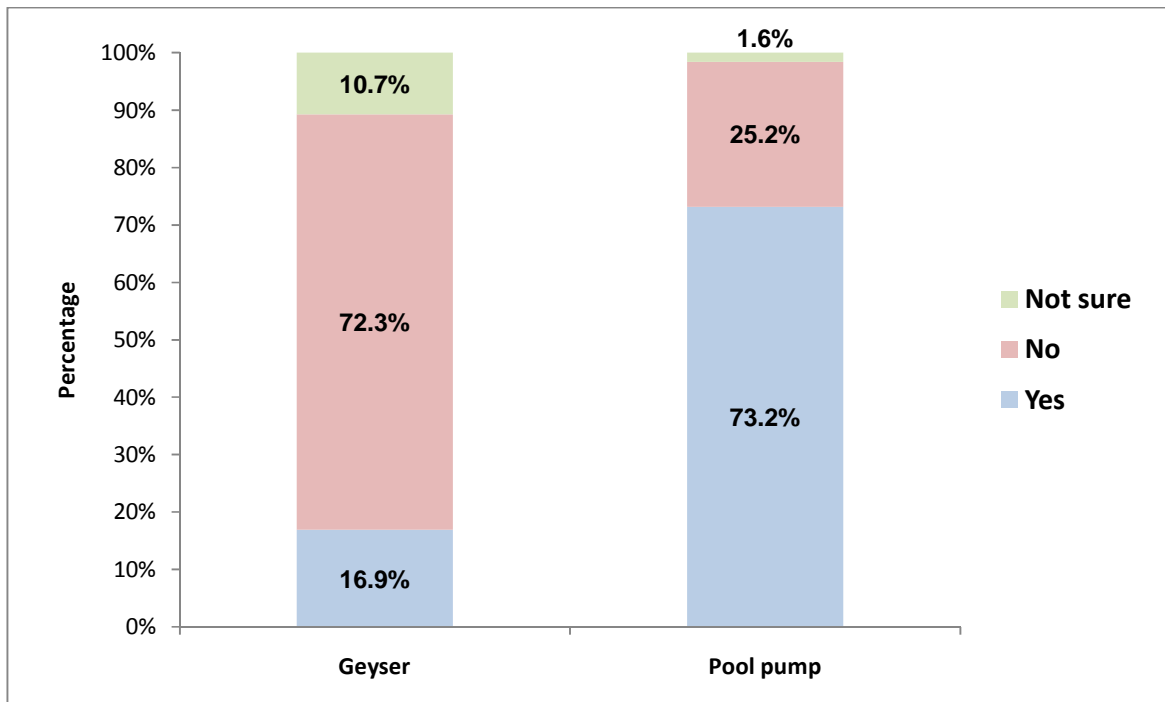
12.1 Would you consider using a geyser blanket if it could help you save electricity?



More than one respondent in every four (29.5%/ n= 104) indicated already using a geyser blanket. Of those who did not use a geyser blanket, 86.5% (n=211) said that they would

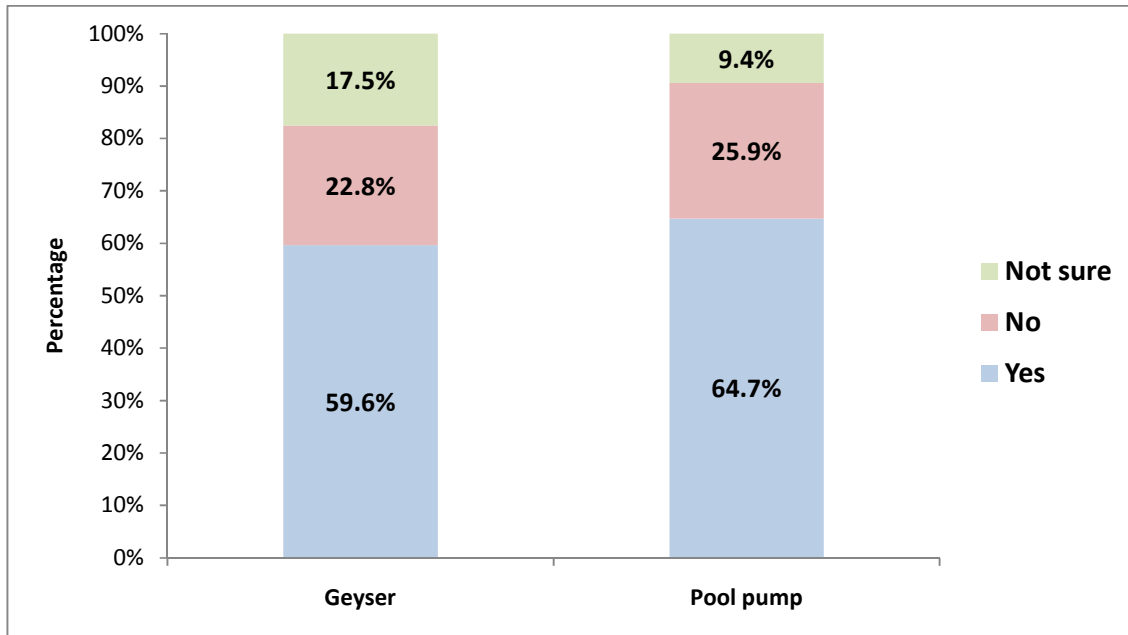
consider using a geyser blanket if it would help them to save electricity (Q12.1). The most important reasons to be mentioned by those who indicated that they would not use a geyser blanket (13.5%/ n= 33), included that using such a blanket did not save electricity (20%/n=6), or that a geyser blanket was inconvenient (40%/n=12). Other objections against the use of a geyser blanket were that it was too expensive or that it could cause a fire.

Q13.1 Do your (a) geyser and (b) pool pump have timers?



Only 16.9% of the households in the sample made use of a timer on their geyser, while one household in every four with a swimming pool also did not have a timer on the pool pump. One household in every ten did not know whether their geysers operated with a timer, or not. As can be seen from the figure below (Q14), more than one-third of the households indicated that the timing devices for their geysers/pool pumps, either did not adhere to Eskom peak-consumption periods, or that they were not sure whether the device(s) adhered or not.

Q14 Does the timing device you have adhere to the Eskom peak-consumption periods?



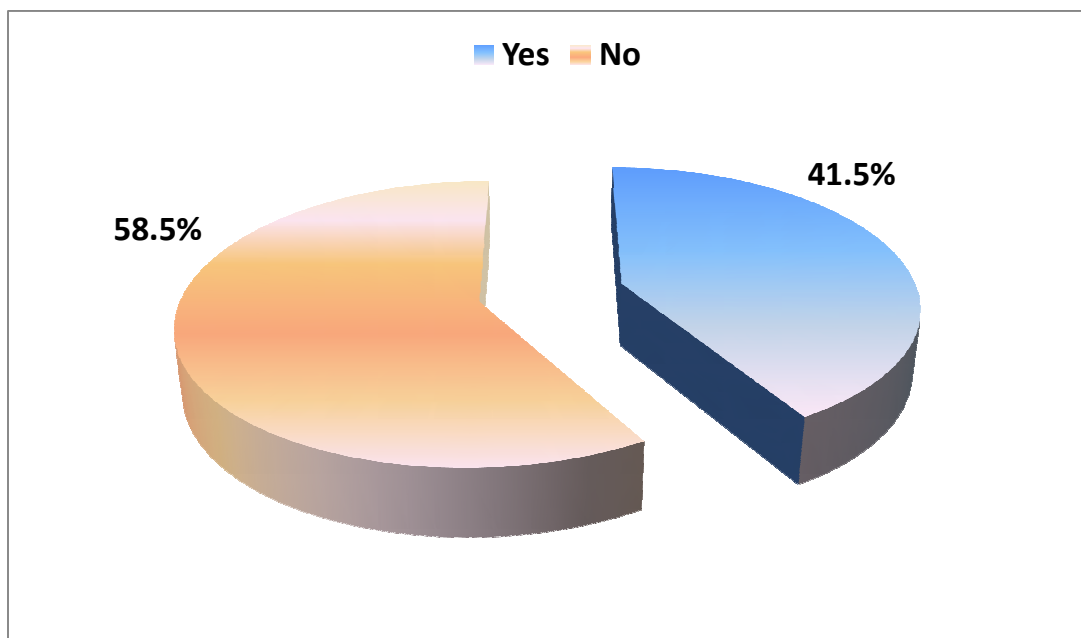
Q15 In the event of a limited power supply, which of the following would you regard as the least important electrical appliance in your house?

Appliances	Proportion who indicated appliance as least important
Fan(s)	70.7% (n=241)
Heater(s)	69.2% (n=240)
Geyser	61.3% (n=217)
Stove/oven	54.2% (n=189)
PC/laptop	54.8% (n=102)
TV set	40% (n=140)
Fridge/freezer	17.2% (n=60)

Q15.1 In the event of a limited power supply, which of the following would you regard as the most important electrical appliance in your house?

Appliances	Proportion who indicated appliance as most important
Fridge/freezer	73.6% (n=254)
TV set	50.0% (n=170)
Stove/Oven	36.5% (n=125)
Geyser	31.8% (n=108)
PC/laptop	25.9% (n=48)
Heater(s)	17% (n=57)
Fan(s)	9.4% (n=31)

Q16 Does your household make use of any alternative sources of energy apart from electricity?



Almost six out of every ten households (58.5%/n=207) in the pilot group relied entirely on electricity as a source of energy. Of those who indicated that they also made use of other sources of energy, 72.5% reported using gas (stoves and heaters) and 22% indicated using

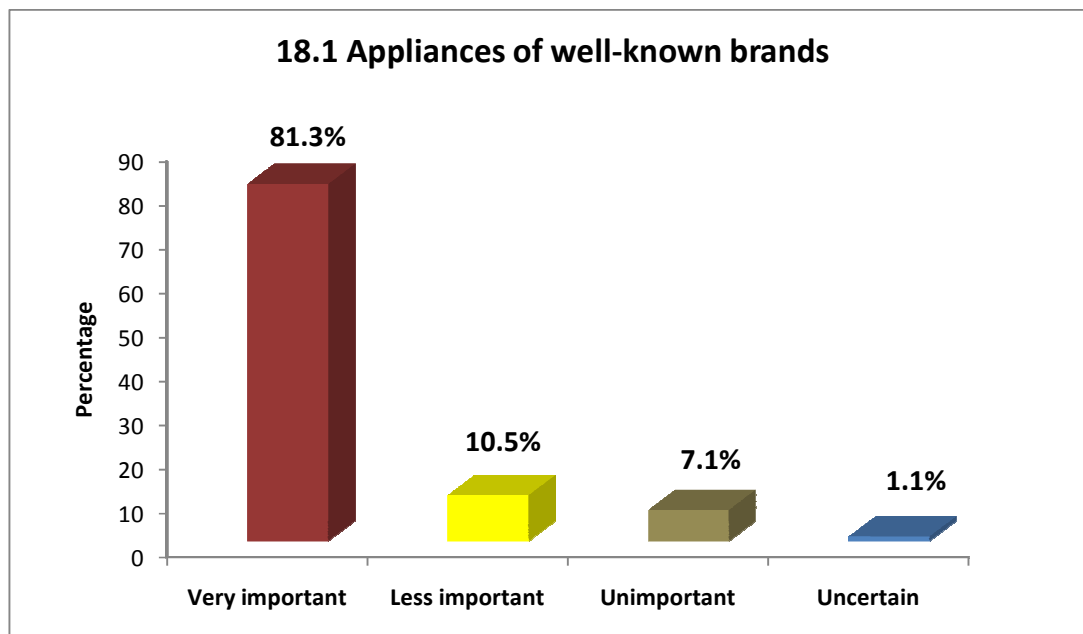
solar panels for either their geysers and/or their pools. A few households also made use of generators.

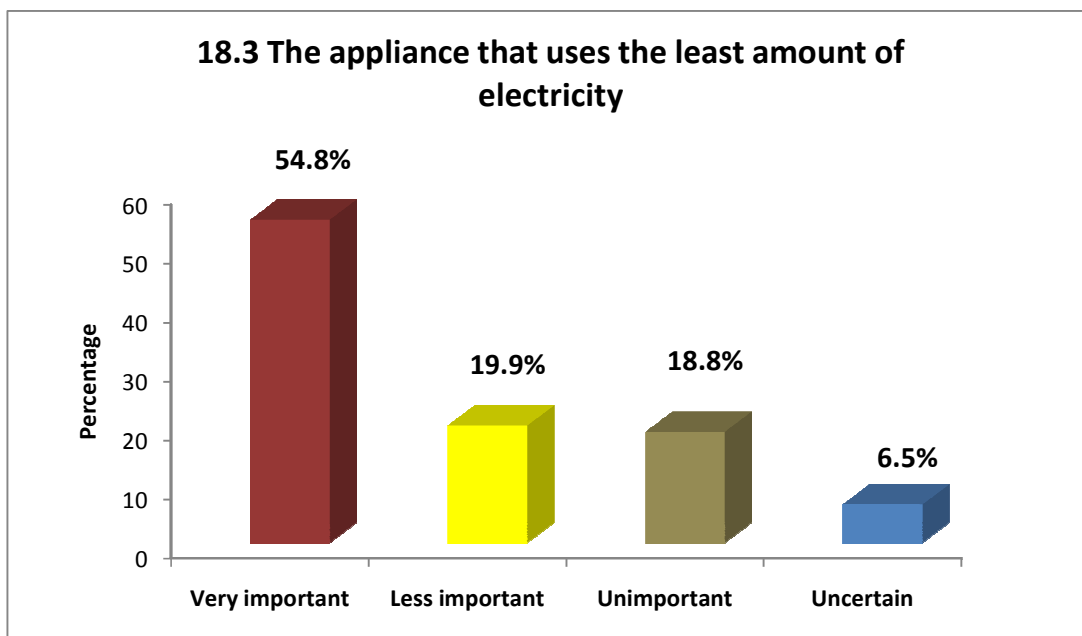
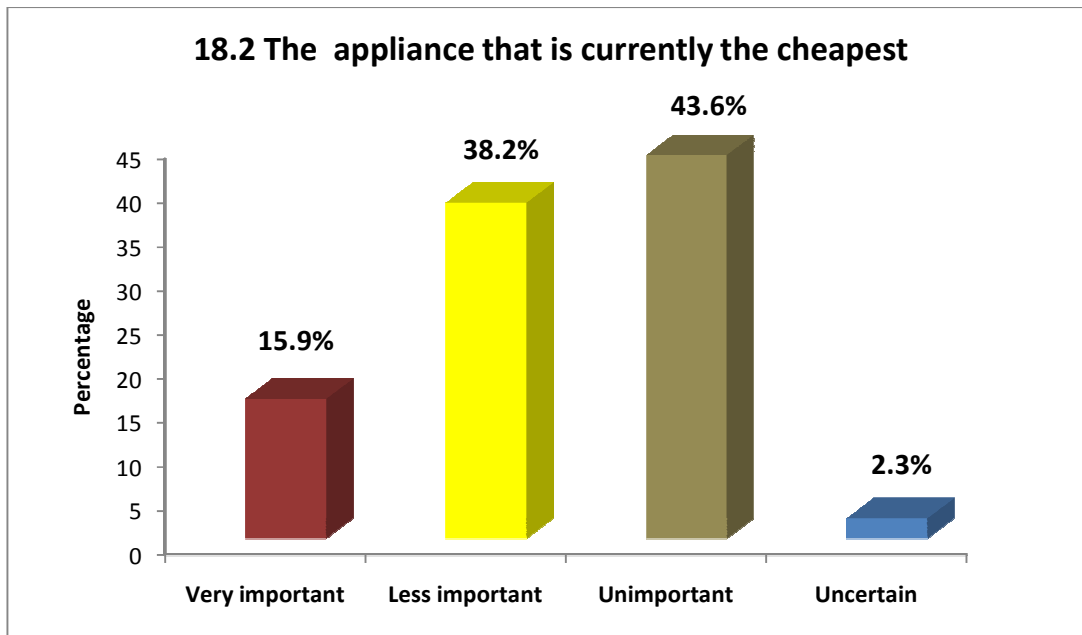
Q17 Does your household make use of any of the following energy-saving devices?

Device	Yes (%)	No (%)
Energy-saving bulbs	93.8	6.2
Solar water heating	5.4	94.6
Solar space heating	0.9	99.1
Solar pool heaters	11.1	88.9
Other solar power	1.2	98.8

Although more than 9 out of 10 households (93.8%/n=332) indicated that they used energy-saving bulbs, the use of solar heating is almost entirely limited to solar pool heaters.

Q18 When purchasing an electrical appliance for your household, how important is each of the following aspects in your choice of product? Tell me if the aspect is very important, moderately important or unimportant:



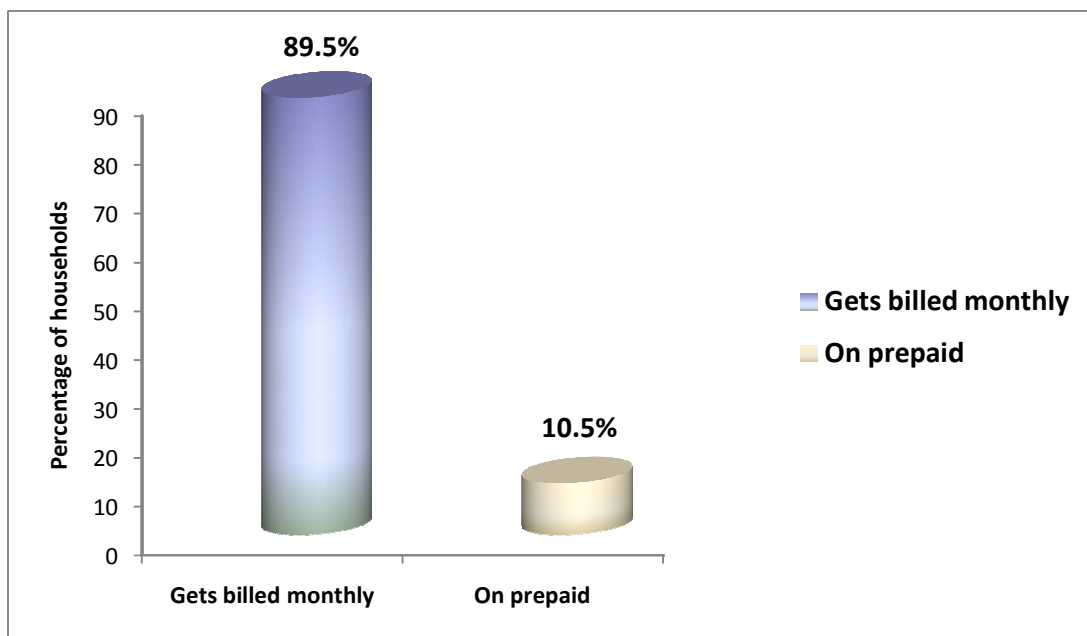


Stemming from the responses to questions 18.1-18.3, one may conclude that when it came to buying electrical appliances for the household,

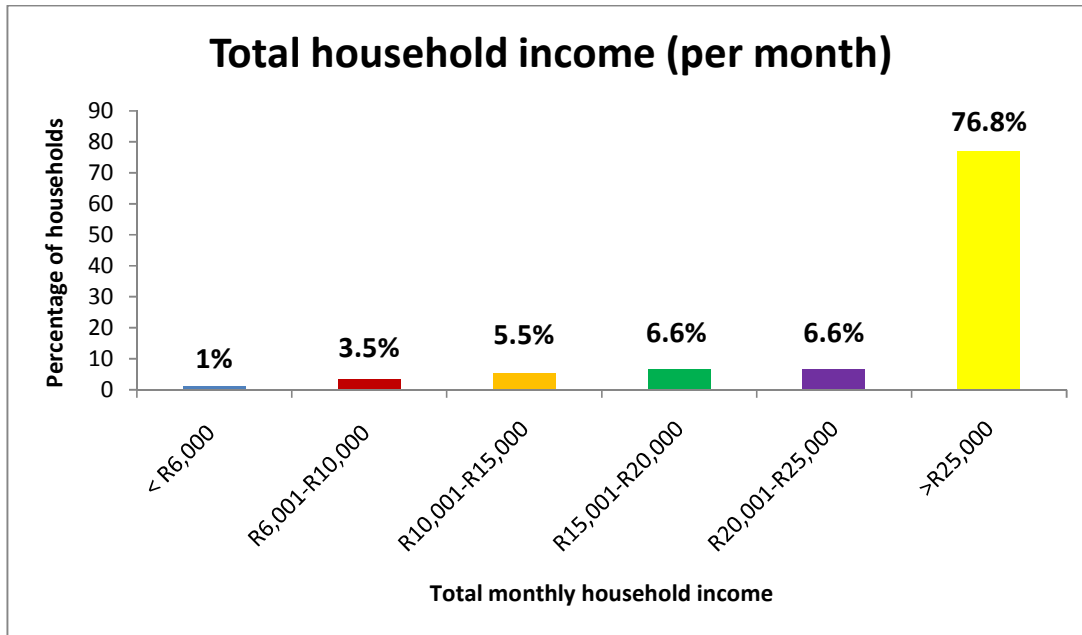
- the brand name was the most important consideration for the majority of respondents (81.3%/n=287);
- the price of the appliance was *less important to unimportant* for more than 80% of the respondents (n=81.8%/n=289);
- one respondent in every five (18.8%/n=66) deemed the amount of electricity used by the appliance as unimportant;
- one respondent in every two (54.8%/n=193) regarded the amount of electricity used by an appliance to be very important; and
- most respondents were inclined to select, in order of importance, an electrical appliance based on (1) the reputation of the brand name; (2) electricity efficiency, and (3) affordability.

Questions 19 to 22 set out to determine the biographical profile of the selected households.

Q19 Does your household receive a monthly bill for your electricity consumption, or do you buy electricity on a prepaid system?

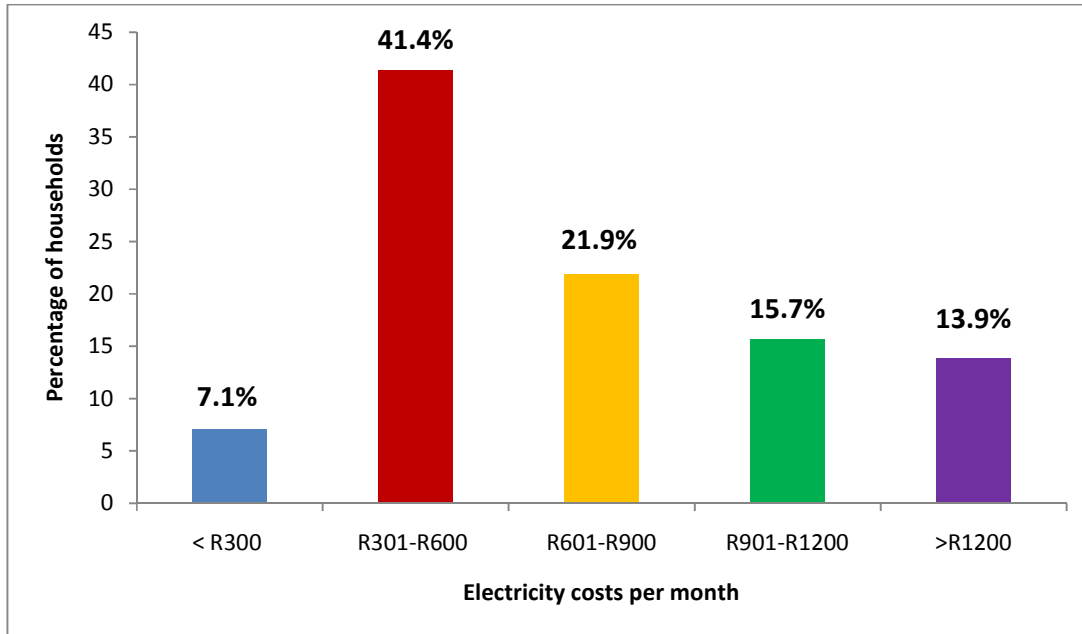


Q20 What is the total monthly combined household income of your household before tax and other deductions? Please include all sources of income, i.e. formal and informal income, pensions, government grants, income from investment, etc.



Three households out of every four fell into the highest category of combined monthly household income. The national profile for LSM 7-10 shows that in total, approximately 99% of all households with a combined monthly income of more than R15 000 fall in LSM 7 (5.2%), LSM 8 (13.1%), LSM 9 (26.0%) and LSM 10 (54.6%) (2007 values). In comparison, more than 90% of the households in the sample had a combined monthly income of more than R15 000.

Q21 How much, on average, does your household's electricity consumption cost each month?



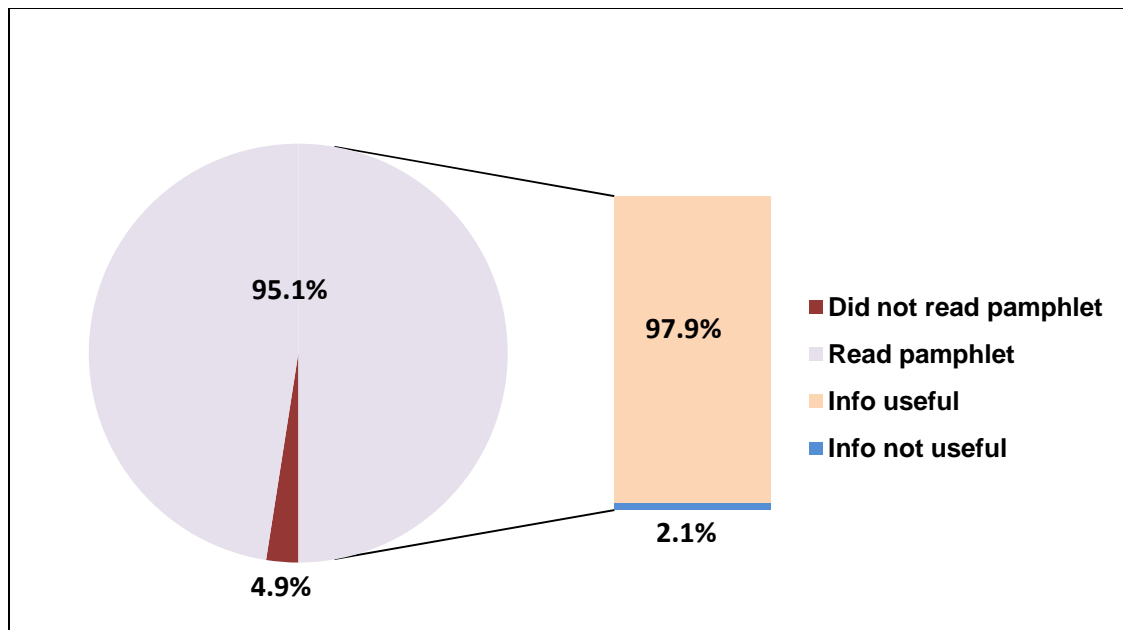
3.2 Findings of the monitor survey

This part of the pilot study was conducted upon completion of each of the two load limiting phases. As indicated in Section 2 of this report, a total of 246 interviews were conducted – 182 in 2009 and another 64 in 2010. Part A of this section reports on the feedback from the households on how they experienced the various technical aspects of the device, while part B reports on the general benefits of the device that were realised from the pilot study.

A Feedback on technical aspects of the device

Q23 Have you read the information pamphlet that you received on the installation of the device?

Q23.1 Did you find the information useful or not?



The vast majority of respondents in the pilot group (95%/n=234) confirmed that they had read the information pamphlet (Q23). Of those who had read the information pamphlet, almost 100% found it very useful (Q23.1). More than 9 out of 10 respondents also found the information on the display easy to understand (Q24).

Only a few households (n=8) indicated that they had not found the information on the display easy to understand. Some of the reasons cited related to the letters being too small, the

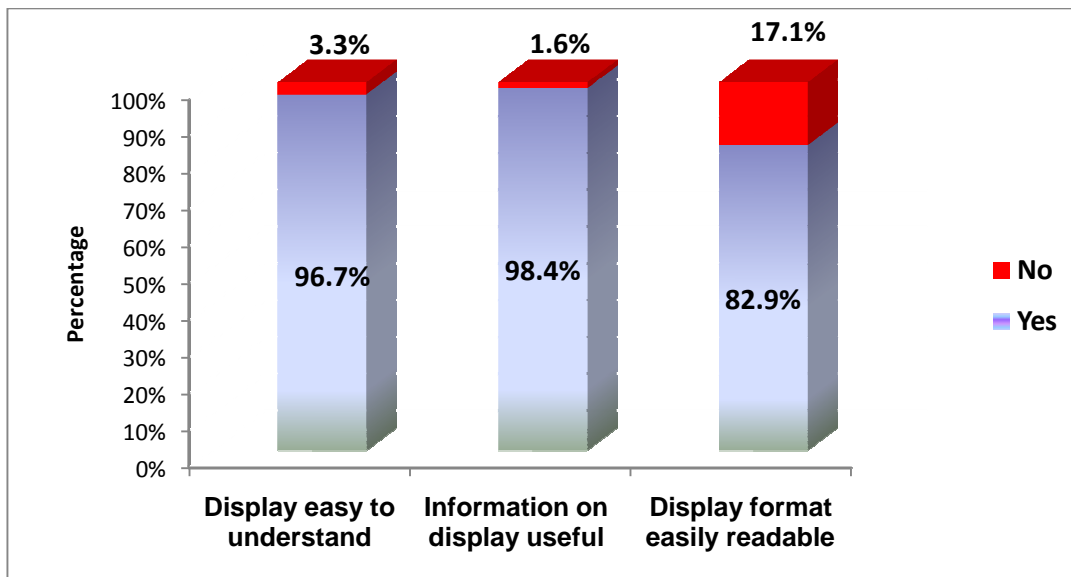
letters being too dark and that they only became used to the information after a couple of days.

In line with the findings in questions 23 and 24, an overwhelming majority of respondents (98.4%) were of the opinion that the information on the display was useful (Q25). Only four respondents indicated that the information on the display was not useful, because the watts for the geyser should also have been reflected on the display (Q25.1).

Q24 Was the information on the display device easy to understand? &

Q25 Did you find the information on the display useful? &

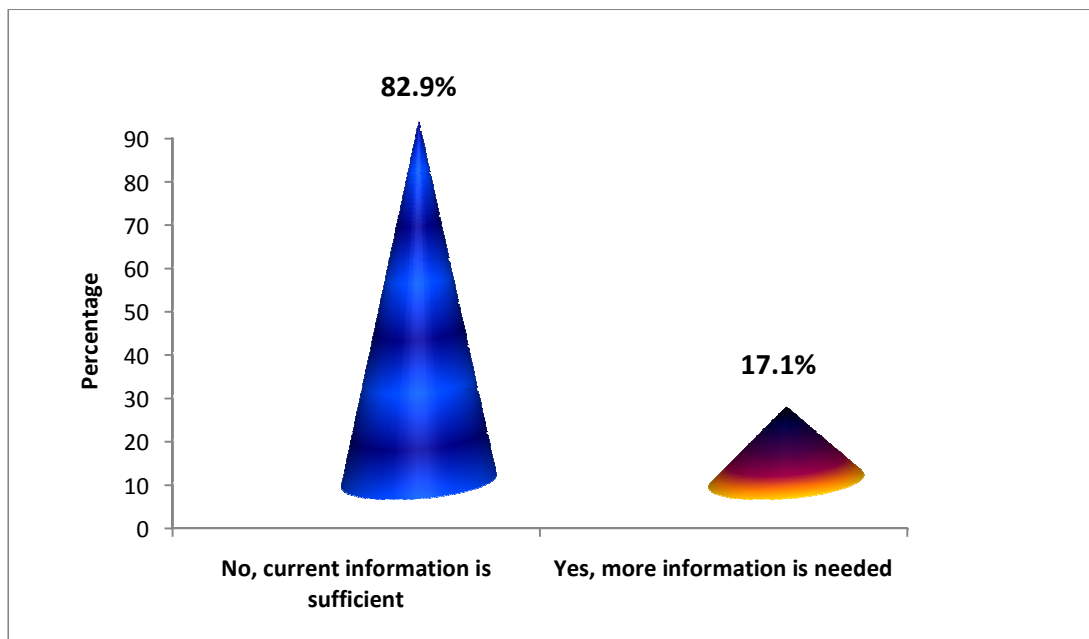
Q27 Is the display format easily readable?



Q24.1 What information did you not understand?

Info not understood	N	%
Took a couple of days to get used to	2	28.6
Underline the fact that you have to put the 'R' in front of the code	1	14.3
Too dark	2	28.6
Lettering too small	2	28.6
Total	7	100.0

Q26 Do you think there should be more information on the display of the device, or is the current information sufficient?

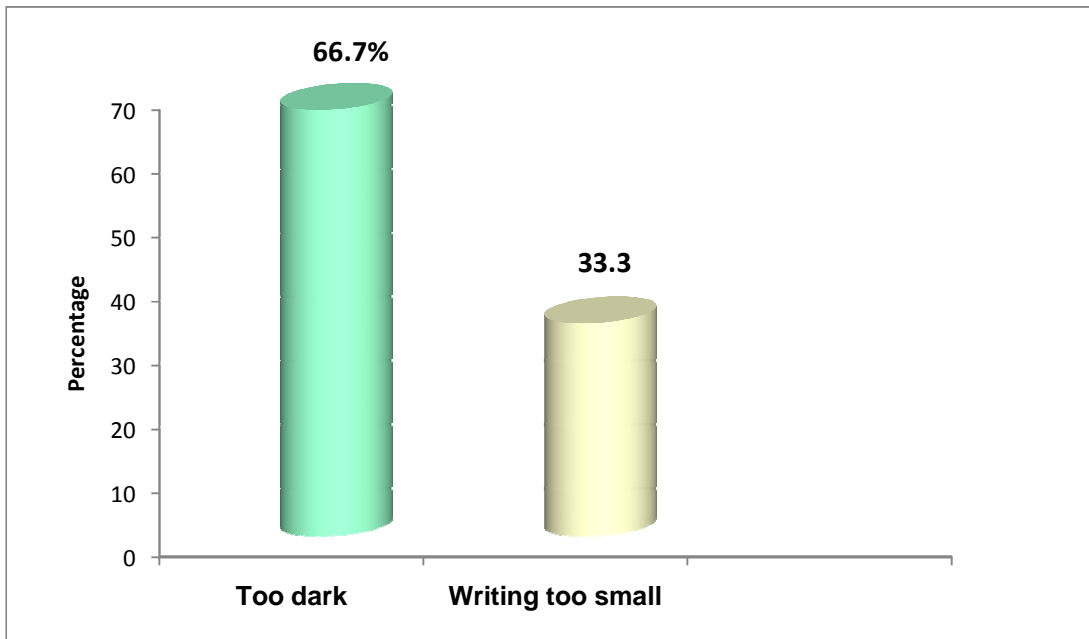


Some 17% of the households requested more information, such as information about appliances and being told the time of load limiting beforehand (Q26 and Q26.1).

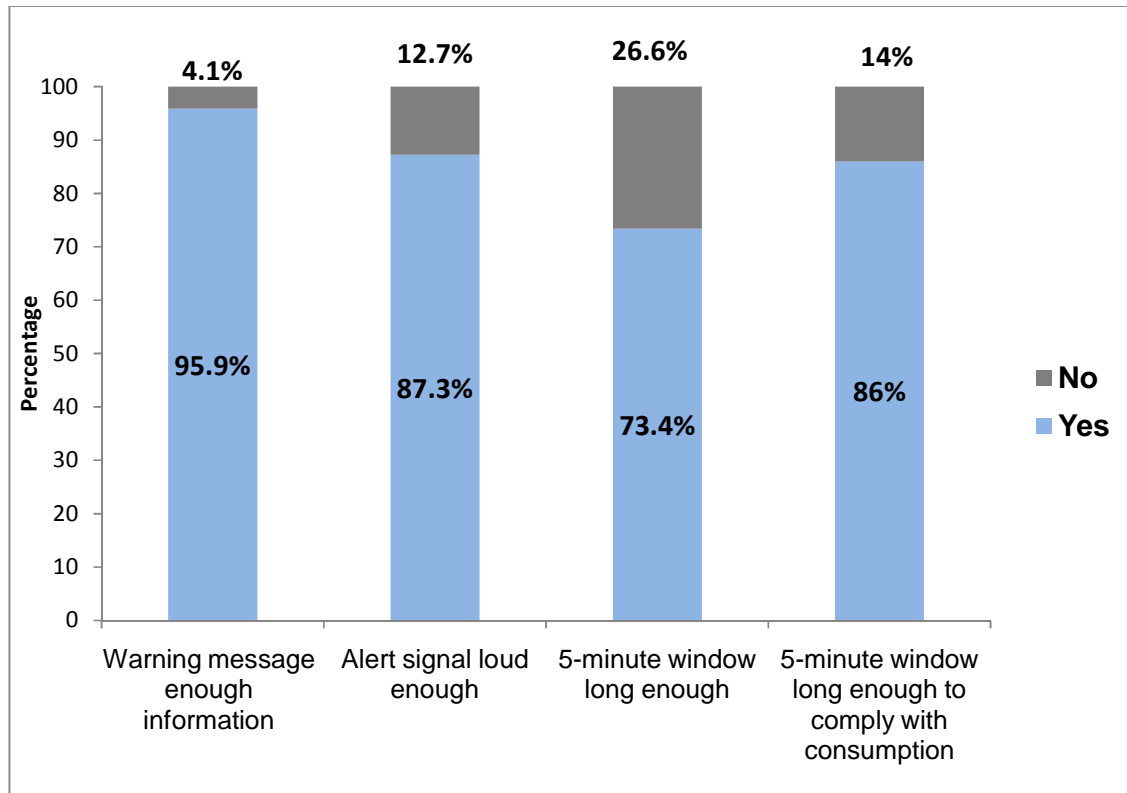
Q26.1 What extra information would you like to see on the display?

Information	N	%
Information about appliances and watts	14	41.2
Give time of load limiting beforehand	9	26.5
Amount of watts currently in use	4	11.8
Warning on display, not on cell phone	2	5.9
Number for SMS	2	5.9
Difficult to read/too small	1	2.9
History of past consumption	1	2.9
Light box on Eddi in case of power failure	1	2.9
Total	34	100.0

More than eighty percent (82.9%) of the households in the pilot group experienced the display format as being easily readable (Q27). Of those households (two out of ten) who did not experience the display as being easily readable, complaints pointed to the display being too dark (66.7%/n=24) and the writing being too small (33.3%/n=12) (Q27.1) (see also Q24.1).

Q27.1 Reasons why the display format was not easily readable

- Q28 Did the warning message contain enough information? &**
- Q29 Was the alert signal loud enough? &**
- Q30 Was the 5-minute window long enough to comply with the initial request to decrease consumption? &**
- Q31 Was the 5-minute window a long enough time to comply with the household power consumption?**



The vast majority of respondents in the pilot group (95.9%) indicated that the warning message contained enough information, while 87.3% and 73.4% respectively, indicated that the alert signal was loud enough and that the 5-minute time window was long enough. Some 86% of households also indicated that the 5-minute window was long enough to comply with the need for decreased consumption (Q28 – Q31). When asked about what else they would like to see in the warning message, respondents mentioned wanting both more information on which devices to switch off and also an earlier warning that consumption levels are too high (Q28.1).

Q28.1 What else would you like to see in the warning message?

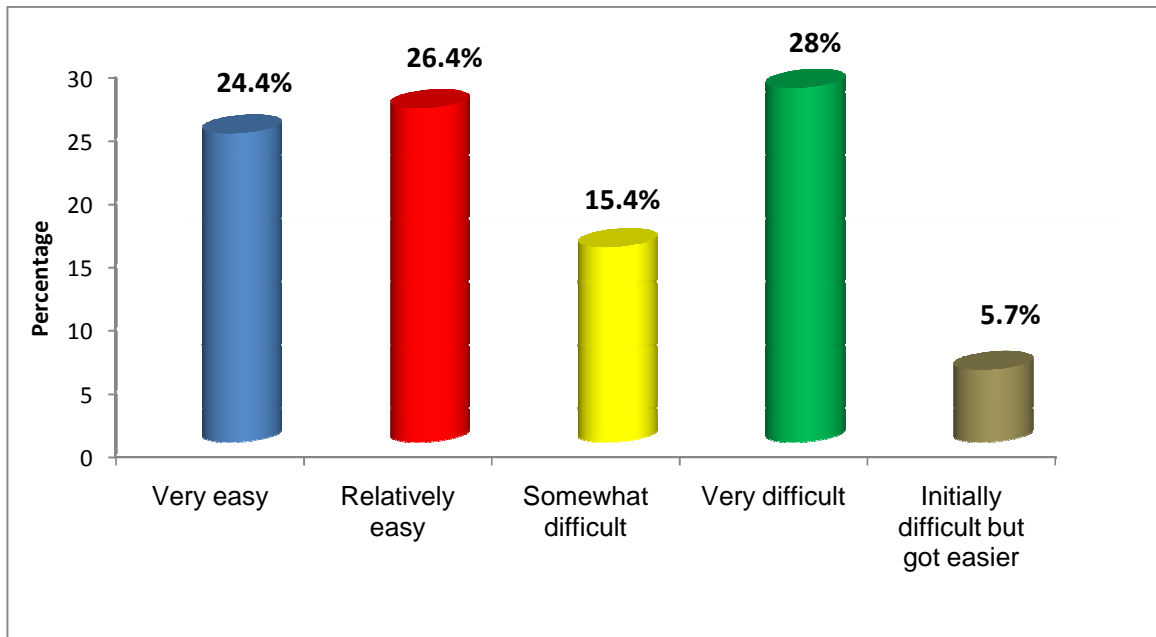
Warning message	N	%
More information - power still high, switch off	2	40.0
Earlier warning	2	40.0
Did not receive message/did not understand	1	20.0
Total	5	100.0

Some 40 (83.3%) respondents of those who were not able to comply within 5 minutes suggested a 10-minute window time period. Some respondents also indicated that they did not know where to switch the power off, and two households were concerned that the power would go off when they were not at home (Q31.1).

Q31.1 Why were you not able to comply within the 5 minutes?

Reason	N	%
Too short - rather 10 minutes	40	83.3
Signal not loud enough	1	2.1
Do not know where to switch power off	5	10.4
Power goes off when not at home	2	4.2
Total	48	100.0

**Q32 How did your household find coping with the lowest limit of power supply set?
Was it...**



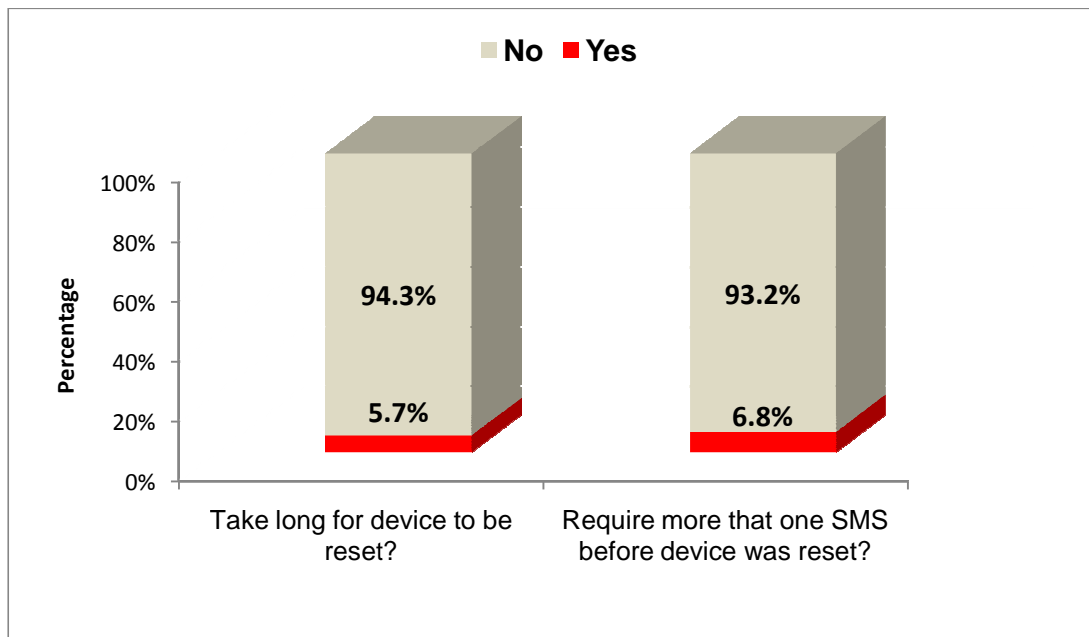
Almost half of the households in the pilot group indicated that it was either *relatively easy* or *very easy* to cope with the lowest limit of power supply, while the rest (43.4%) experienced the lowest limit of power supply as *somewhat difficult*, or *very difficult* to cope with (Q32).

Q33 When you had to cut down on your electricity use during the pilot, did you switch to any alternative source of energy?

Alternative energy	N	%
No	156	63.7
Yes, gas	68	27.8
Yes, bio-fuel	1	0.4
Yes, coal/wood	2	0.8
Nothing - just waited for power to come on again	10	4.1
Combination	8	3.3
Total	245	100.0

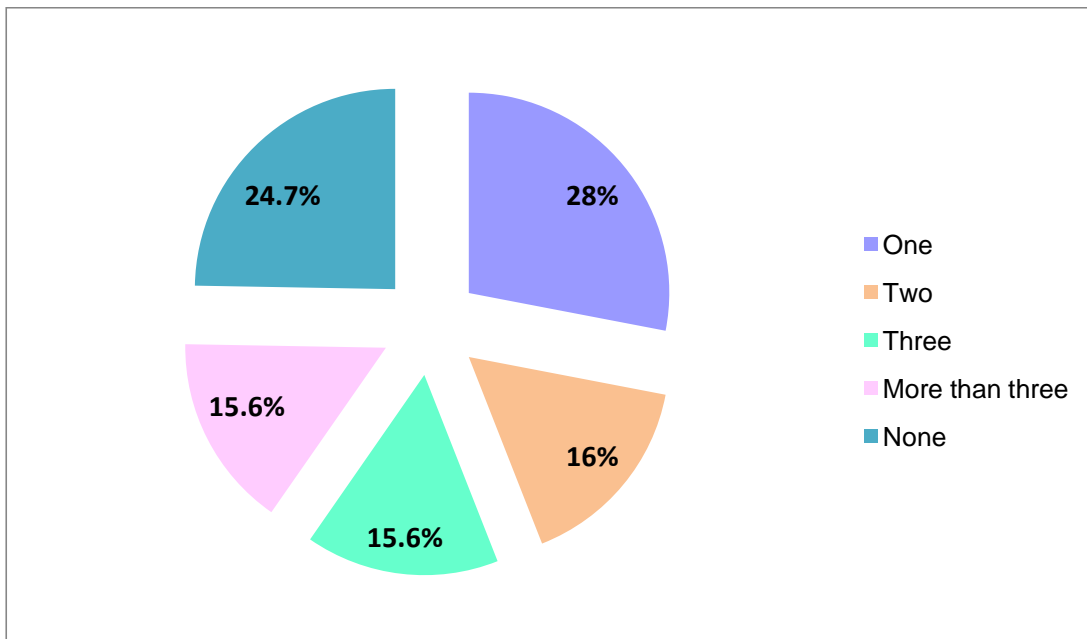
Approximately one-third of the households in the pilot group used alternative energy sources (mainly gas) when they had to cut down on electricity consumption.

Q34 What was your experience of the SMS reset function? Did it:



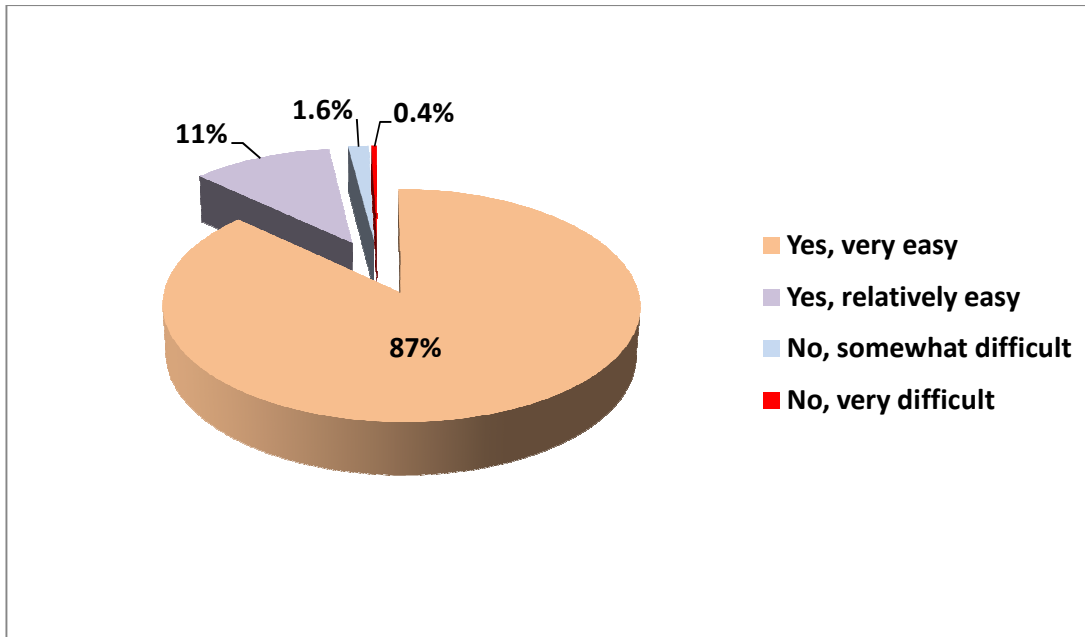
Only a very small proportion of the respondents (5.7%) found the SMS reset period to be too long, while only 6.8% of the respondents experienced more than one SMS reset (Q34.1 & Q34.2).

Q35 How many resets did you go through?



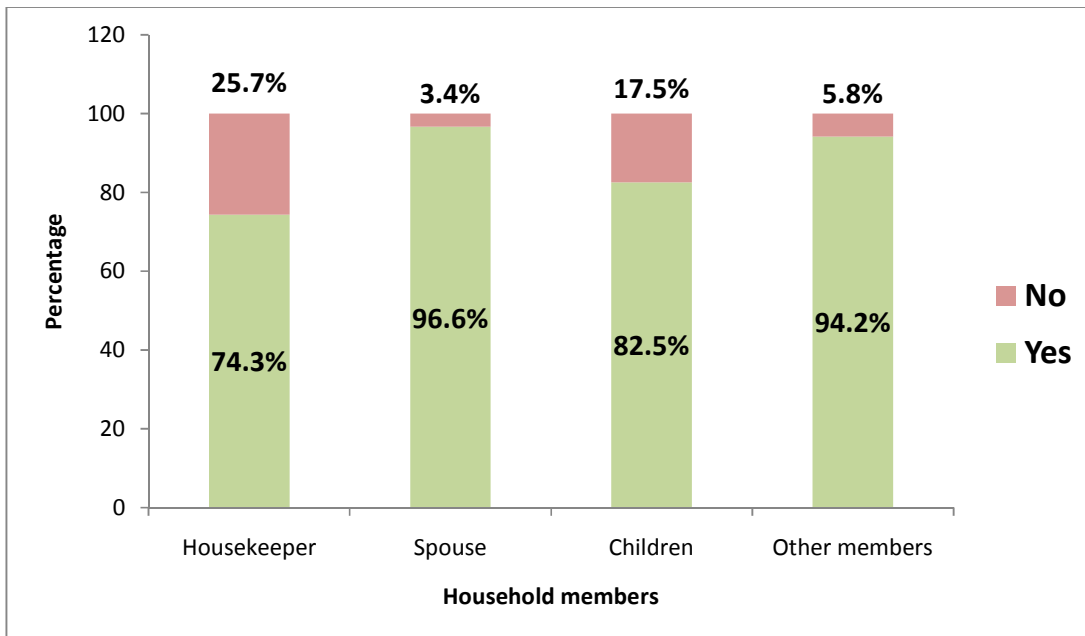
A quarter of the households had no reset experiences (24.7%), while 28% had one reset experience, 16% had two reset experiences, and almost a third of the households (31.2%) had three or more reset experiences during the pilot (Q35). Put differently, some three-quarters of the households experienced resets during the pilot phase.

Q36 Was the overall process of load limiting easy to understand, or not?



The above diagram (Q36) indicates that only 2% of the respondents (i.e. 5 of the 246 households) found the overall process of load limiting difficult to understand. Almost 9 out of 10 households (87%) found the overall process very easy.

Q37 Do you believe the following members of your household will be able to work with the device, if asked to do so in the future?

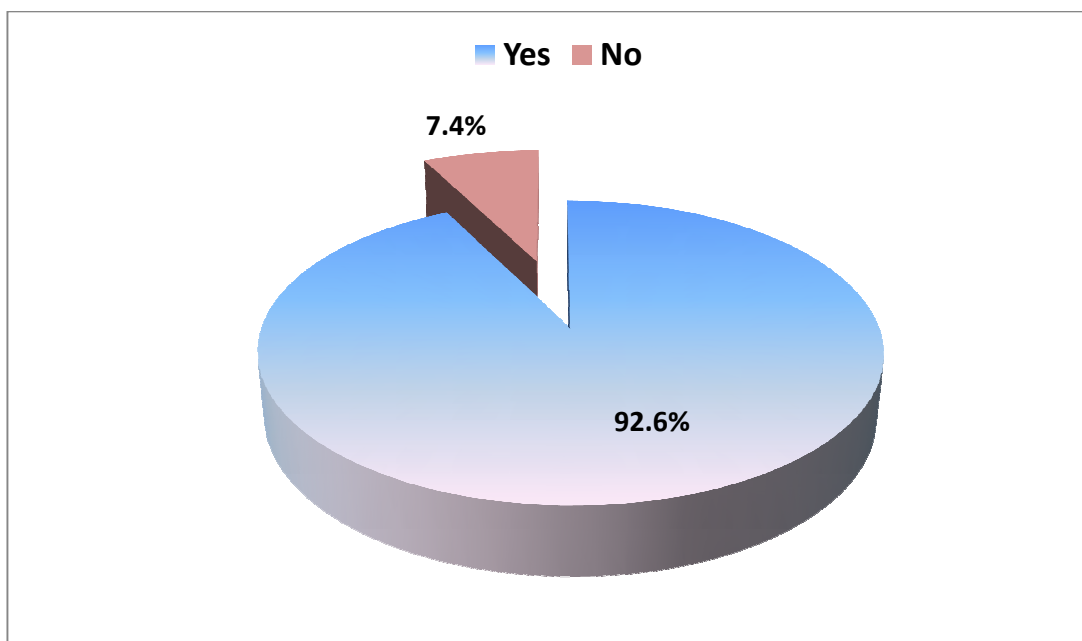


Most of the respondents were of the opinion that the members of their households would be able to operate the device, although there were a few reservations (almost 26% of the sample), particularly with reference to housekeepers. The most important reason for this scepticism was the poor literacy level of some housekeepers, while some respondents also pointed to the fact that the device was too complicated both for their housekeepers and young children (see table below).

Q38 Reasons why some members of the household would not be able to operate the device

Reasons	N	%
1. The device is too complicated and too difficult to understand.	15	25.9
2. The housekeeper is illiterate and will first need to be educated.	29	50.0
3. The device interferes with the housekeeper's workload and she finds it stressful.	2	3.8
4. Children are too young	11	19.0
5. Do not always have airtime to SMS	1	1.9
Total	58	100

Q39 Do you think that your household can save on your electricity bill by using the load-limiter device, or not?



Households in the sample were overwhelmingly convinced that they could indeed save on their electricity bill by using the load-limiter device. Only 18 households (7.4%) disagreed,

and their reasons are tabulated below. The most important reasons included the fact that some households already had measures in place to save the maximum electricity and that they did not believe that further savings were possible; others pointed out that their households would still use the same amount of electricity - only the consumption periods would differ.

Q39.1 Reasons why households believed they would not save on the electricity bill by using the load-limiter device

Reasons for not saving	N	%
1. Do not yet know effect on electricity bill	3	20.0
2. Household will still use the same amount of electricity; geyser will still have to heat up – only later	5	33.3
3. The device is malfunctioning: after resetting, it goes up too much.	1	6.7
4. Eating times and habits of household will have to change	1	6.7
5. I never waste electricity, and I never use too much of it; retired – already save the maximum	5	33.3
Total	15	100

Q40 Can you think of any suggestion that might help to improve the use of the device?

Suggestions to improve device	N	%
1. More information is needed about: average consumption watts for appliances; codes for SMS; load-limiting times for household; average usage/watts usage.	37	27.8
2. Display on the device is not easy to read; background light should be lighter; needs backlight when dark; screen is not user friendly	27	20.3
3. There should be consistency in the times of load limiting/quantity of units. Different times of load limiting in the evening should be ruled out; time limits are not convenient for cooking; publish schedule on website	18	13.5
4. Increase the warning time; it is not sufficient.	16	12.0
5. The limit of 2000W is far too low for an entire household; increase limit.	15	11.3
6. Louder signal needed; consider multiple alarms in different rooms	5	3.7
7. Other (call-centre staff are rude; any appliance using too much power should trip automatically; device should indicate when Eddi is faulty.)	15	11.3
Total	133	100

Although a substantial proportion of households did not experience any problems with the device and did therefore not have any suggestions to offer to improve the device's

functionality, a number of practical suggestions were offered by some households who believed that the use of the device could be improved. Foremost among these suggestions was the need for additional information on the display, such as the average consumption watts for different appliances (27.8%). The display on the device should be made more user friendly, as it was found to be too difficult to read (20.3%). Other suggestions included wanting the limit of 2000 watts to be increased (11.3%) and also wanting an increase in the warning time (12%).

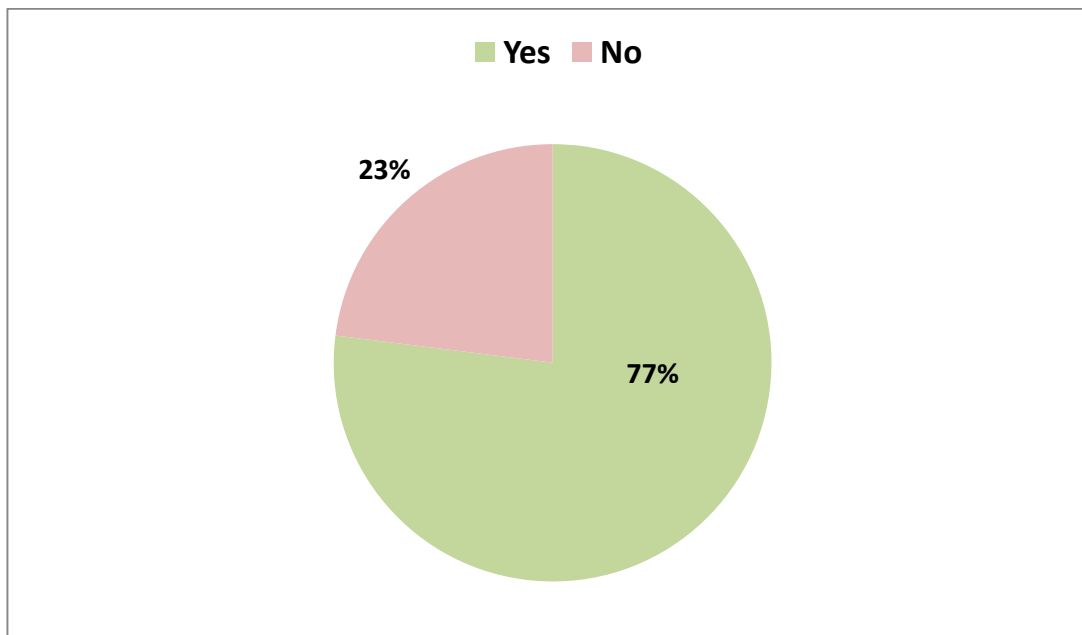
B Benefits realisation

Q41 Considering your experience with the device over the past few days, how will this change the type of appliances you purchase in future with regard to power saving? Will you

buy appliances without necessarily paying attention to their power-saving abilities?, OR	8.5%	N=21
compare the power- saving abilities of appliances before deciding which one to buy?	85.4%	N=210
<i>Uncertain/do not know</i>	6.1%	N=15

Almost 9 respondents out of 10 indicated that they would compare the power-saving abilities of appliances before any future purchase. Clearly, the device has managed to create a greater sensitivity and awareness among households in the sample of the electricity consumption of different appliances.

Q42 Have you deliberately cut back on the use of any electrical appliances since the start of the pilot?



More than three-quarters of the households confirmed that they had cut back on the use of electrical appliances since the start of the pilot. The table below makes it apparent that the geyser was targeted by most households, while substantial numbers also cut back by switching off/not using interior lights, the stove/oven, kettle and pool pump.

Q42.1 List of electrical appliances on which households cut back

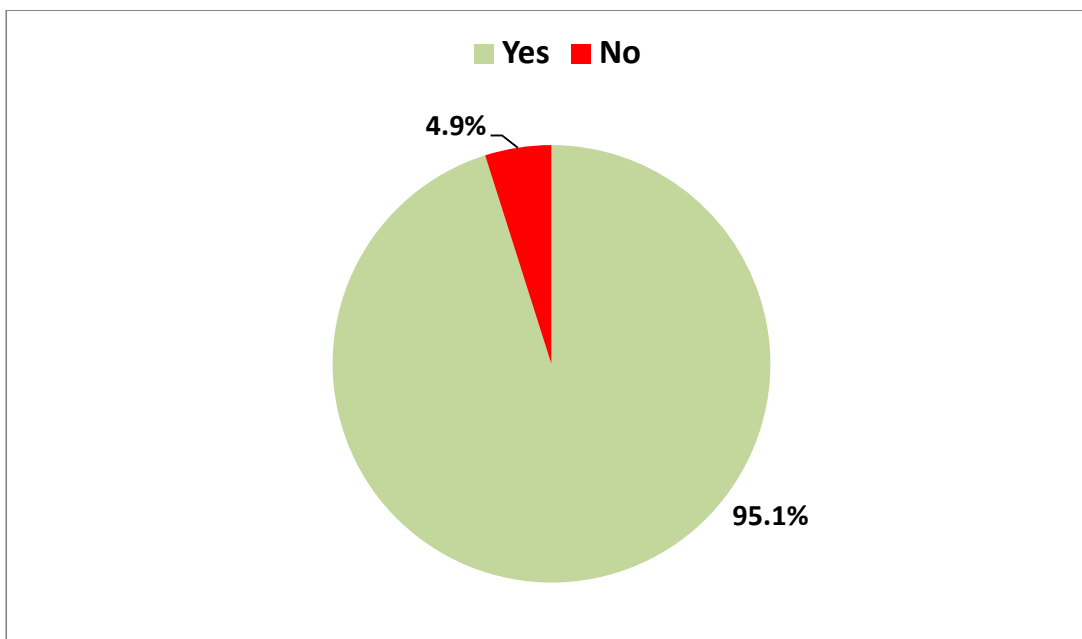
Appliance	%	Appliance	%	Appliance	%
Geyser	31.2	Kettle	11.4	Fridge/freezer	2.4
Lights (interior)	12.7	Pool pump	8.9	Washing machine	2.4
Stove	6.5	TV/DVD/VCR	3.5	Irrigation/water features	1.6
Oven	5.1	Microwave oven	2.7	Tumble dryer	1.3
Computers	0.5	Small appliances	2.2	Iron	0.8
Dishwasher	0.8	Other (air-conditioning unit, frying pan, garage doors, electric gate, etc.)	5.4		

Q42.2 During what periods did you cut back? Did you cut back**

during the whole two-week period of the pilot programme (regardless whether it was a load-limiting period or not)?	78.2%	N=43
OR		
only when you were asked to reduce your consumption during load-limiting periods?	21.8%	N=12
Total	100	N=55

** This question was only put to the 2010 sample, hence the relatively small N-value.

Almost eight households out of ten indicated that they deliberately cut back on the use of electrical appliances during the whole two-week period of the pilot programme, and not only during load-limiting periods. Monitoring the actual power “saving” effected by these households would thus be difficult in that the behavioural change was not limited solely to load-limiting periods. At the same time, however, this behavioural change suggests that a substantial proportion of households was sufficiently sensitised by the mere presence of the device to adopt electricity-saving measures even beyond the load-limiting periods.

Q43 Would you recommend that the power utility uses this device as an alternative to blackouts, or not?

Almost all the households in the sample (95.1%; n=233) would recommend the use of the load-limiting device as an alternative means of overcoming blackouts. The reasons for not

recommending the device are listed below. Most of these concerns can be addressed by either technical intervention (e.g. reason 3) or an educational campaign (e.g. reasons 1 and 6).

Q43.1 Reasons for not recommending the device

	Reasons	N	%
1.	Device will put more stress on network; rather build more power stations	3	27.3
2.	Rather save electricity by cutting off people who do not pay.	2	18.2
3.	Device did not work properly; limit is too low	2	18.2
4.	System will not work with more than two people in household or in larger households.	1	9.1
5.	Not suitable for working families	1	9.1
6.	Rather focus on other wastages of power; households are small users	2	18.2
Total		11	100

From the following table it is clear that the most beneficial aspect of the device is the fact that it both creates and increases awareness of their electricity consumption patterns among households, and thus sensitises households regarding the need to save electricity in order to prevent blackouts. The device also created a learning experience for many households and, in general, instilled a better understanding of power usage in the household (see point 3 in Q44). This has also been confirmed by the response to Q47, in which more than 98% of the households confirmed that they had a better understanding of power usage in their household subsequent to their experience with the device.

Q44 What was the most beneficial aspect of using the device?

	Most beneficial aspect	N	%
1.	The device made us aware of how much electricity we use. It was nice to monitor our usage and to be aware of how much power we actually waste. We are now aware of the (power) usage of different appliances.	117	50.0
2.	Device enabled us to gain a better perspective on household consumption in order to prevent blackouts. We were never without power and learned a lot about the need to save electricity.	91	38.9
3.	The device taught our family how to save electricity. The device taught us that it is better to have some power than none. We now have new knowledge on electricity consumption.	26	11.1
Total		234	100

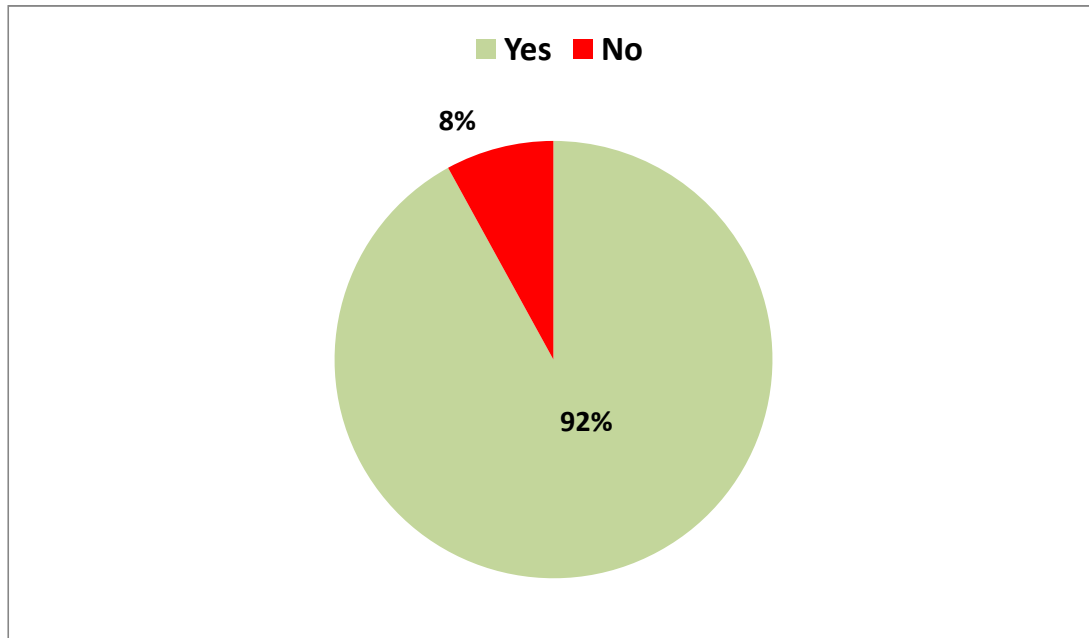
The most negative aspect associated with the device was the drastic change in lifestyle and the revision of conventional habits that it required (see table below). Technical aspects or

complaints about the device were mentioned in only a few cases (see points 4-8 below), while a substantial number of households indicated that their experience of the device was in no way negative. The change in lifestyle and in the conventional power-consumption patterns of the household necessitated by the device also meant that, subsequent to the installation of the device (Q46) almost all respondents were compelled to involve their household members in saving on electricity consumption. In most cases (83%), this involvement applied for the entire pilot period, and not only for the duration of load limiting (Q46.1).

Q45 What was the most negative aspect of using the device?

	Most negative aspect	N	%
1.	It required a change in lifestyle, as it was inconvenient and a hassle to switch everything off. It takes time to get used to it, as we couldn't keep everything switched on at all times.	73	35.8
2.	The limited amount of power allocated is insufficient. The limit of 1000W is too low.	26	12.7
3.	Inconvenient periods of load limiting; the household is very busy during peak times at night.	57	27.9
4.	The warning time of 5 minutes is too short.	9	4.4
5.	We did not receive notice of load limiting in advance and could not plan properly.	18	8.8
6.	The device did not work properly; sms wrongly; screen is too big and wastes space.	13	6.4
7.	The warning signal was not loud enough.	4	2.0
8.	The display is not clear enough and difficult to read.	4	2.0
Total		204	100

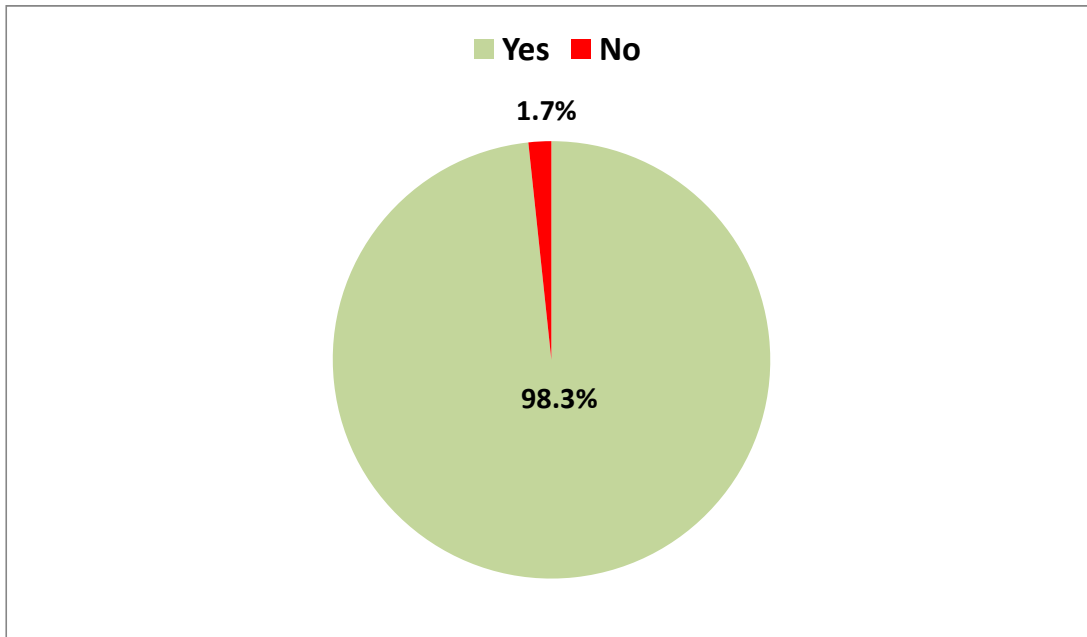
Q46 Have you involved your household members in saving on electricity consumption since the installation of the device?



Q46.1 Was their involvement mainly limited to periods when

you were asked to deliberately decrease consumption as a result of load limiting?	17%%	N=8
OR		
did your household members constantly strive to save electricity during the whole two weeks of the pilot programme?	83%	N=39
Total	100	N=47

Q47 Now that you have experienced the device, do you have a better understanding of power usage in your household, or not?



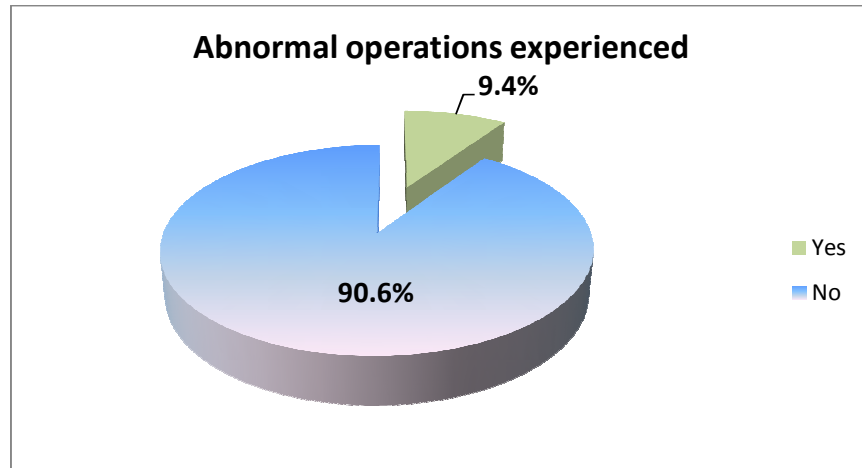
Q48 Which ONE of the following two options would you prefer?

Living with blackouts (i.e. without power), but without having to worry about the device? OR	1.6%	N=4
Living with the device as a means to overcome blackouts?	97.1%	N=238
<i>Uncertain/ do not know</i>	1.2%	N=3
Total	100%	N=245

It is clear from the responses to Question 48 that the respondents were almost unanimous (97.1%) in their opinion that living with the device - despite some of the initial problems and technical frustrations - is preferable to living with blackouts.

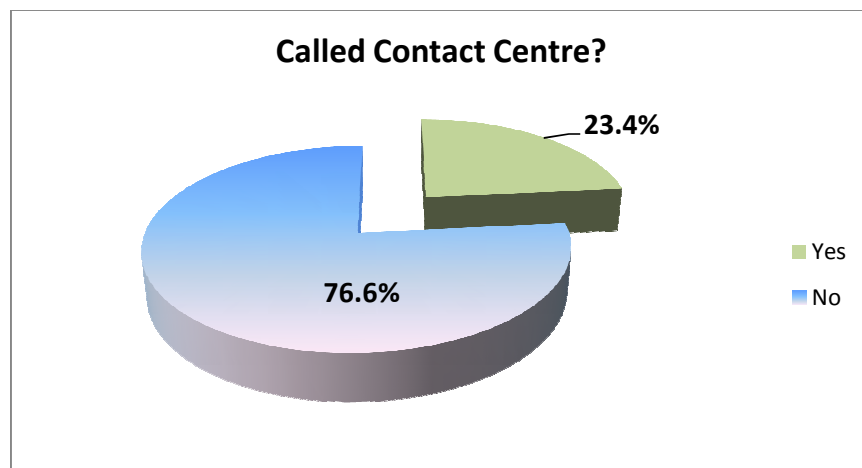
Note: Questions 49-55 were only put to the 2010 sample, and not to the 2009 sample; hence the small N-values.

Q49 Have you experienced any abnormal or anomalous operations of electronic equipment such as alarm systems, timers, PC's, printers, etc. while the device was used?



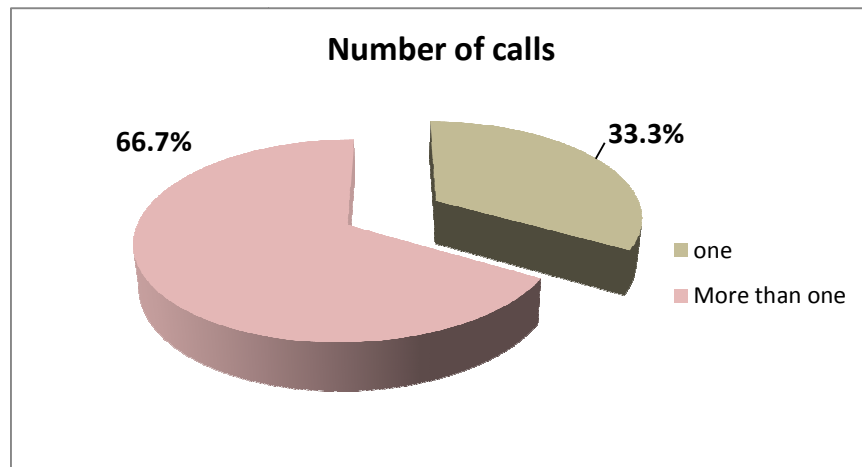
Only 6 households in the sample (9.4%) experienced anomalous operation of electronic equipment while the device was in use. In most cases ($n=5$), such abnormal functioning related to the alarm system going off during resets or when the power supply to the household was cut (Q50). One respondent claimed that the electronic clocks in the house had been affected while the device had been in use.

Q51 Did you call the Eskom Contact Centre at any time during this pilot period?

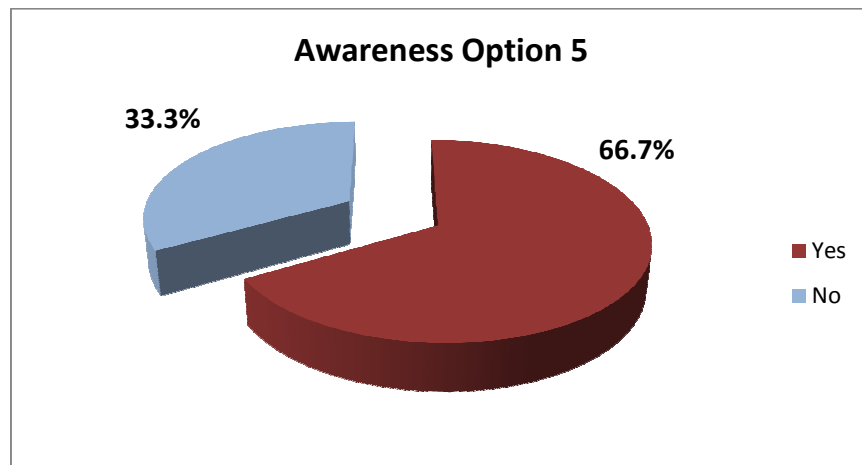


Almost a quarter of the participants (n=15) indicated that they had indeed called the Eskom Contact Centre during the pilot period. Five of these households (n=33.3%) called the Contact Centre only once, while the rest (n=10/66.7%) made more than one call to the Contact Centre (Q52). The responses to Q54 suggest that most calls to the Contact Centre were in connection with inactivated or faulty devices.

52 Did you call the Contact Centre only once, or more than once?



Q53 Were you aware that you had to choose option 5 (blackout option) when phoning the Eskom Contact Centre during the pilot period?



54 What was your question about?

1. Where and when to collect the Eddi	0	0
2. Starting time of load limit	n=2	10.5
3. Eddi was not activated and did not work	n=7	36.8
4. Advice on how to register cellphone	n=2	10.5
5. Power being off NOT during a load-limiting time	n=4	27.8
6. Power being off during a load-limiting time	N=4	27.8
Total	19	100

55 How would you rate the service you received from the Contact Centre?

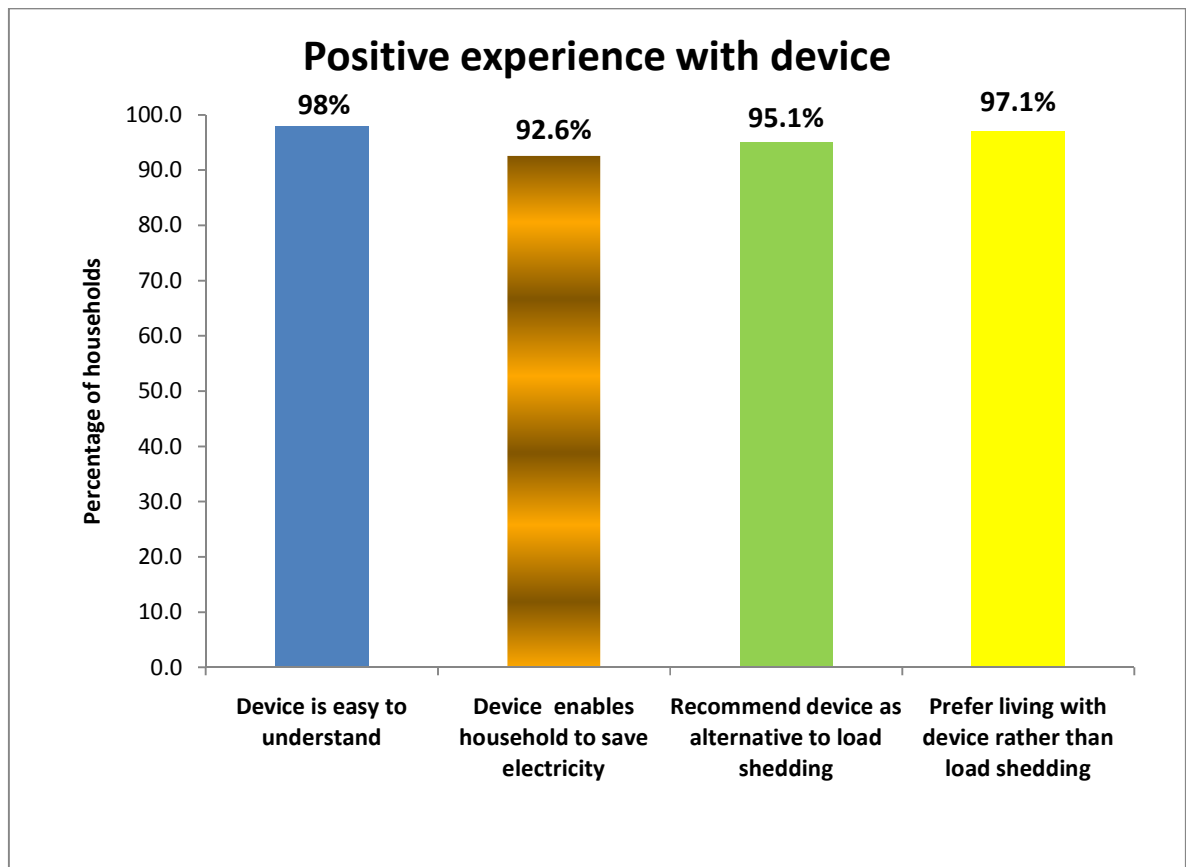
Allocate a mark out of 10 where 1=very bad, 5 = average and 10= excellent

Total marks	15
Average mark allocated	5.8
Mode (n= 5)	4
Highest mark (n=1)	10
Lowest mark (n=1)	1

4 Core findings and conclusions

□ Finding 1: Households demonstrated having had a positive experience with and perceptions of the load-limiter device

Initial indications suggest that the principle of load limiting, and the load-limiter device in particular, have been positively experienced by the vast majority of households. This should however be interpreted in the light of the fact that recruitment for the programme was not done randomly, but on a voluntary basis. Notwithstanding the limitations of the sample, the fact remains that almost the entire sample would prefer living with the device than being subjected to blackouts. A summary of households' positive experience of the device is given below.



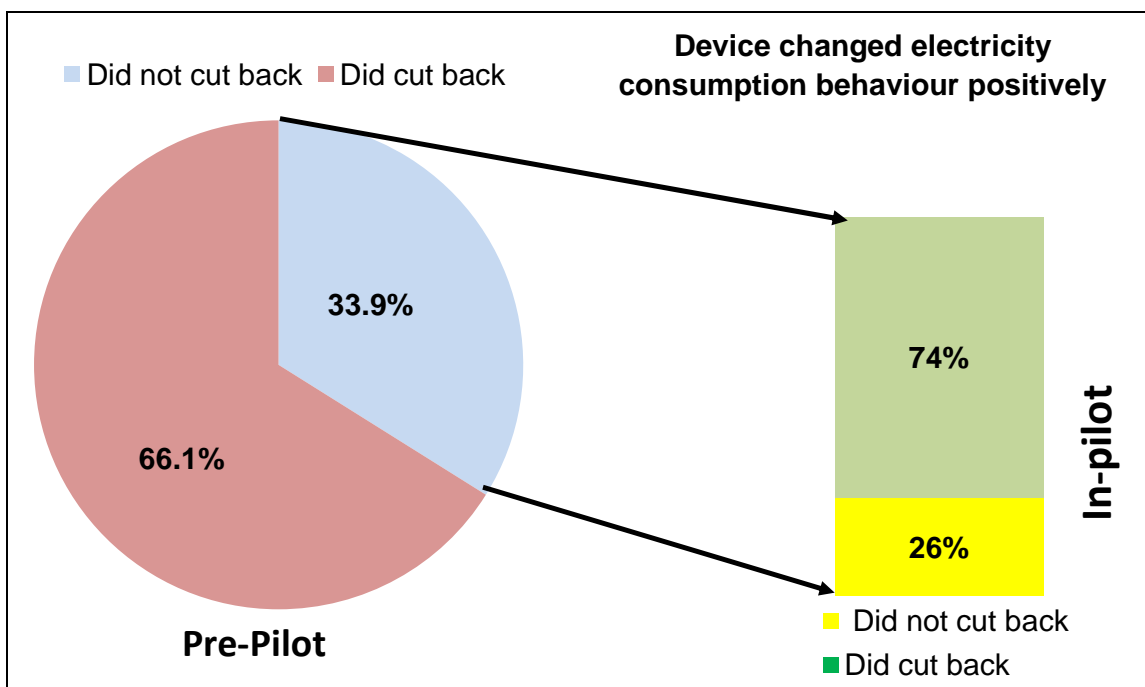
□ **Finding 2: Exposure to the device improved the knowledge levels regarding electricity consumption.**

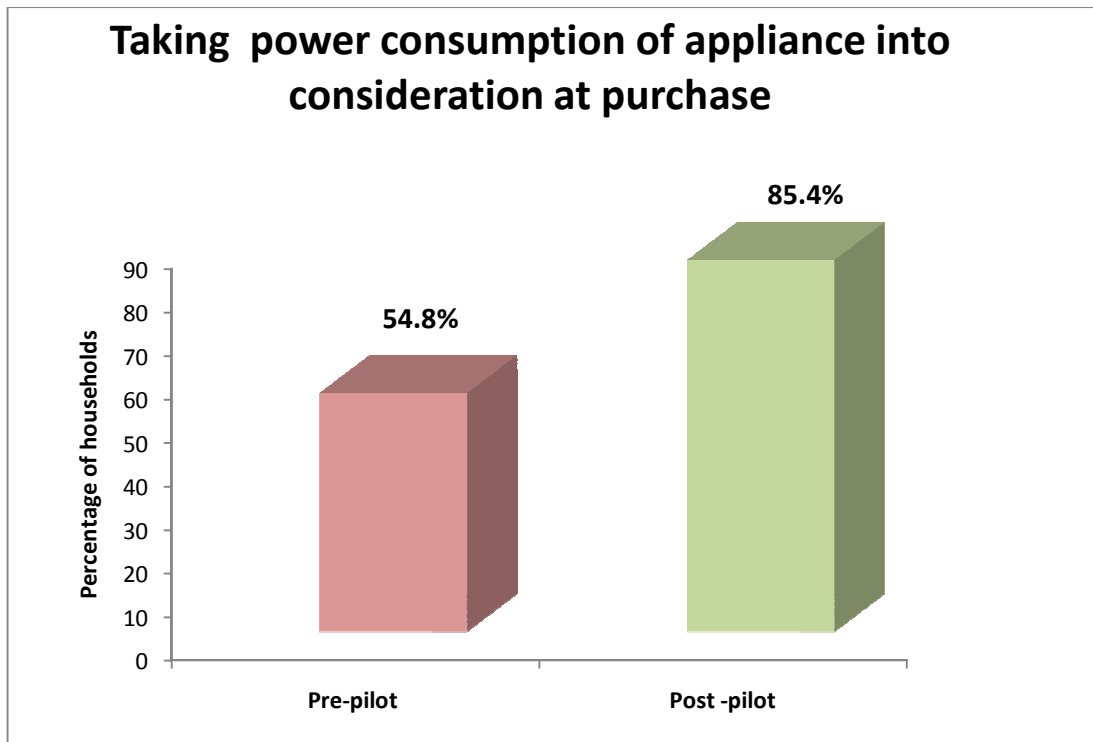
Prior to the pilot phase, more than 90% of the households in the sample claimed to be 'consumer sensitive' in the sense that they involved the members of their households in saving electricity. Yet, in many cases, this awareness did not seem to translate into action. An important reason for the gap between intention and action can be traced back to a lack of information or poor knowledge about the drivers of electricity consumption. For instance, almost 60% of the households could either not correctly identify the Eskom peak hours, or they thought they knew the correct peak hours, but had it wrong. The fact that almost three-quarters of the households in the sample were not using a geyser blanket at the time of the survey – though maintaining that they would nevertheless consider using one to save electricity (86.5%) - further raises questions both about the level of knowledge regarding power-saving measures amongst the sampled households and about their willingness to translate their knowledge into concrete actions to save electricity. The same applies to the substantial proportion of households not switching off the lights when leaving a room, and not making use of timers for their geysers and/or pools, or whose timers are not aligned with Eskom's peak hours. Apart from the use of energy-saving bulbs, a lack of knowledge and/or an unwillingness to translate knowledge into action prevents a large number of households in the sample from making substantial power savings. This signals the strong presence of a 'comfort zone' or 'consumer mentality' among the sampled households, rather than urgency of environmental awareness and of resource sensitivity. **After the pilot phase**, however, it turned out that a slightly higher proportion of households did in fact start involving household members in saving electricity. This involvement also translated into switching off high-consumption appliances such as geysers, kettles and pool pumps during load-limiting periods. Most significant, however, is the fact that in 83% of the cases, this involvement extended beyond load-limiting periods (See Finding 3). Also, substantial proportions of the pilot group spontaneously reported an increase both in their awareness of electricity consumption and in their knowledge of electricity saving as having been the most beneficial aspects of using the device.

Most beneficial aspect of using device	
The device made us aware of how much electricity we use.	50%
The device enabled us to gain a better perspective on household consumption in order to prevent blackouts.	38.9%
The device taught our family how to save electricity.	11.1%

□ **Finding 3: Households' experience with the device raised awareness of electricity consumption and changed consumption behaviour positively.**

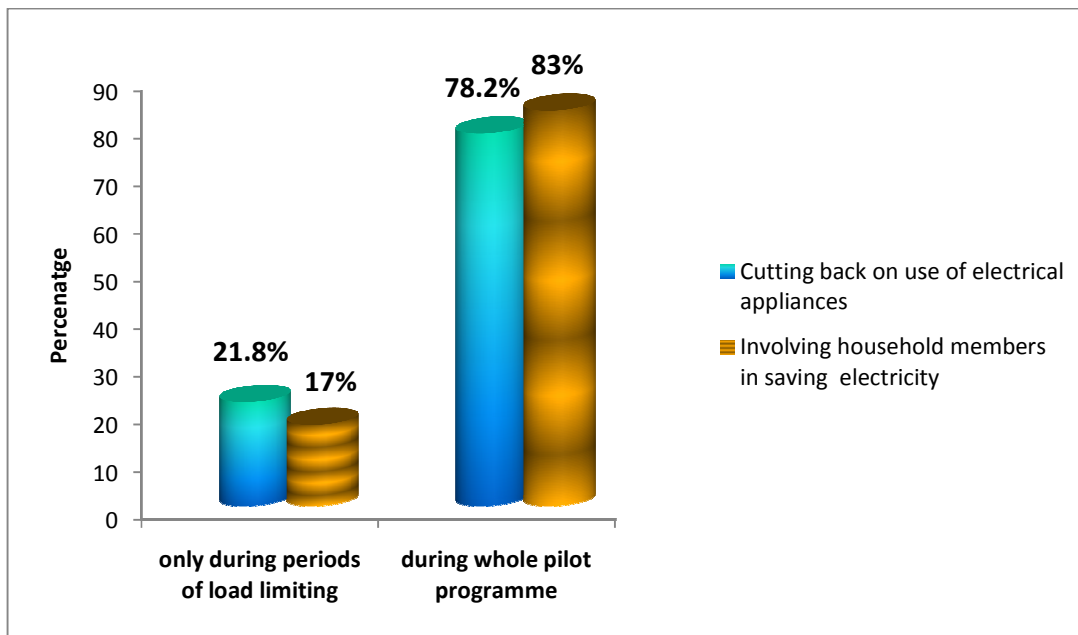
Before being introduced to the device, more than one-third (33.9%) of the households admitted that they had never cut back on their electricity consumption by switching off some appliances during Eskom peak hours. A statistical cross-correlation shows, however, that 74% of this group deliberately cut back on the use of electrical appliances since the pilot started. Prior to the pilot phase, most households considered the brand name of an appliance to be more important than the amount of electricity used by the appliance. However, following their experience in the pilot phase, 85.4% of the sample indicated that they would compare the power-saving abilities of appliances before deciding on a purchase.





- **Finding 4: Behavioural change as a result of exposure to and experience in using the device extended beyond load-limiting periods, which suggests a lasting impact of awareness regarding electricity consumption**

Indications are that, in eight households out of ten, both a raised awareness of power consumption and a subsequent positive behavioural change were not limited to load-limiting periods, but occurred throughout the entire pilot period. Although this might complicate the measuring of the actual power-saving impact of the pilot group, the broader implication of such behavioural change suggests a continuous and probably lasting impact of the device on consumption behaviour. This is further confirmed by the finding that more than 80% of household members constantly strove to save electricity during the whole two weeks of the pilot programme, and not only during periods of load limiting.



- **Finding 5: Communication interventions proved to be effective BUT awareness levels of sources of additional publicised information should be raised**

Almost one household in every two did not know where to source additional information about the load-limiting programme. Considering the fact that the sample mainly reflected attributes of LSM levels 9 and 10 (i.e. households typified by higher levels of education and income), this aspect – access to additional information – should be addressed in the further roll-out of the programme, particularly when lower LSM levels might be targeted.

- **Finding 6: Although the device did not cause any major technical difficulties, consideration could be given to improve (a) the readability of the display; (b) the information on the display (by adding additional information on appliances, and (c) increase the 5-minute window for warnings.**

Although most of the technical aspects of the display were experienced positively, concern was nevertheless expressed (in approximately 17% of the cases) about the readability not being up to standard, the lack of more information about the power usage of appliances, and about the 5-minute warning period being too short (27%). The sound level of the device could be added to this list, seeing that 13% of the pilot group claimed that this was not loud enough.

□ **In conclusion...**

Based on the findings, it can be concluded that the pilot group

- experienced the device in a very positive way.
- quickly adapted to the device.
- demonstrated a greater awareness of electricity consumption after using the device.
- demonstrated confidence in using the device.
- demonstrated positive behavioural change beyond the load-limiting periods.
- firmly believe that they can save on electricity by using the device.
- will use the device as an alternative to blackouts.
- will encourage the roll-out of the device.
- did not, along racial lines, demonstrate any significant differences in respect of experiences and perceptions of the device.

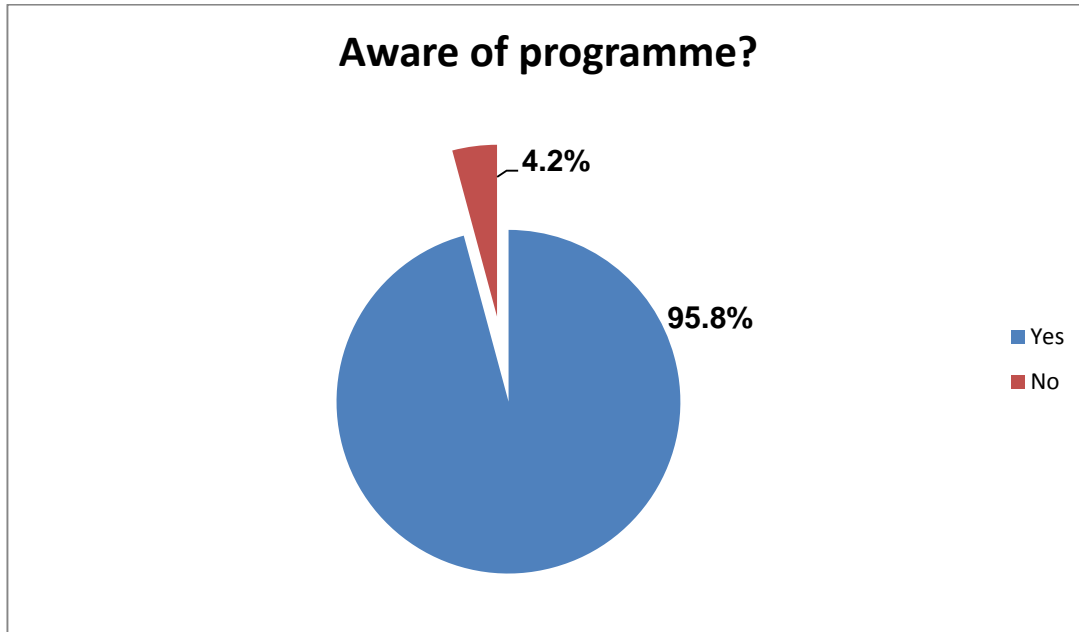
5 Perceptions of non-participants

5.1 About the sample

As mentioned earlier, another secondary survey was also conducted among a sample of non-participants in the load management pilot programme. The main purpose of this third survey was to determine the reasons of those residents of Lonehill, Paulshoff and Fourways who, though they were invited to join the load management pilot programme, for some reason declined to do so. Subsequently, two segments of residents were identified and targeted for survey purposes, i.e. (a) those who attended an information meeting but never signed a consent form, and (b) those who signed a consent form but never came to collect their Electricity Demand Display Indicator (Eddi). From a sampling frame of 165 qualifying residents, a total of 144 successful interviews were conducted, bringing the response rate to 87.3%. The remaining 21 residents on the list could not be interviewed (despite several attempts spread over a number of consecutive days) because of reasons such as (i) not answering the call (n=8); (ii) wrong or no contact numbers (n=7); (iii) phone being on voicemail (n=4), and (iv) refusing to grant an interview (n=2).

5.2 Findings of the non-participant survey

Q1 Were you aware of the load management pilot programme in your area before the interview?



Almost all the respondents (95.8%) confirmed that they had been aware of the load management pilot programme in their residential areas prior to the start of the interview. Only six respondents (4.2%) had been unaware of the programme, but nevertheless confirmed that they were still resident in the sample area at the time of the interview (Q-B3). None of these six respondents, however, could remember anybody dropping a letter at their residence to inform them about the pilot programme (Q-B4). As a result, these six respondents did not qualify for further participation in the survey.

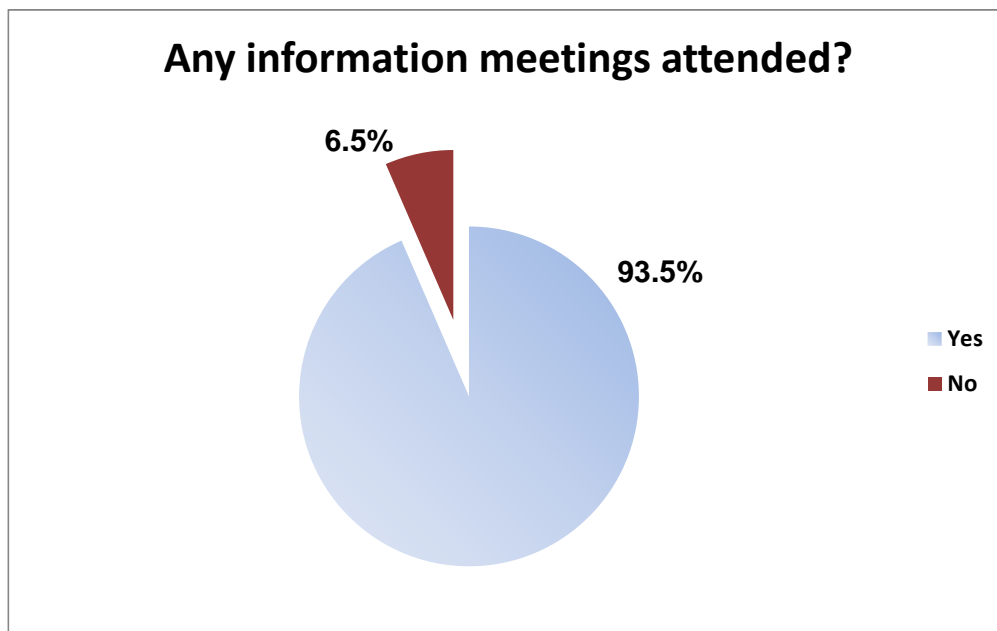
QA2 How did you come to know of the load management pilot programme in your area?

Source	N	%
Spoke to participants	14	8.6
Spoke to installation team	-	--
Eskom contact centre	6	3.7
Lonehill residents' newsletter	84	51.5
Eskom website	1	0.6
Eskom information letter	40	24.5
At work; family; friends; email	18	11.0
Total	163*	100

*The total in this table refers to the number of responses and not the number of respondents.

Most of the non-participants indicated they had been informed of the pilot programme in writing, i.e. either by means of the residents' newsletter or an Eskom information letter.

QA3 Did you attend any of the information meetings about the programme?



Only nine respondents (6.5%) indicated that they had not attended any of the information meetings about the programme. Asked about the reasons for failing to attend any of the meetings (QA4), the nine respondents offered several explanations. These are tabulated below.

QA4 Reasons for not attending any of the information meetings

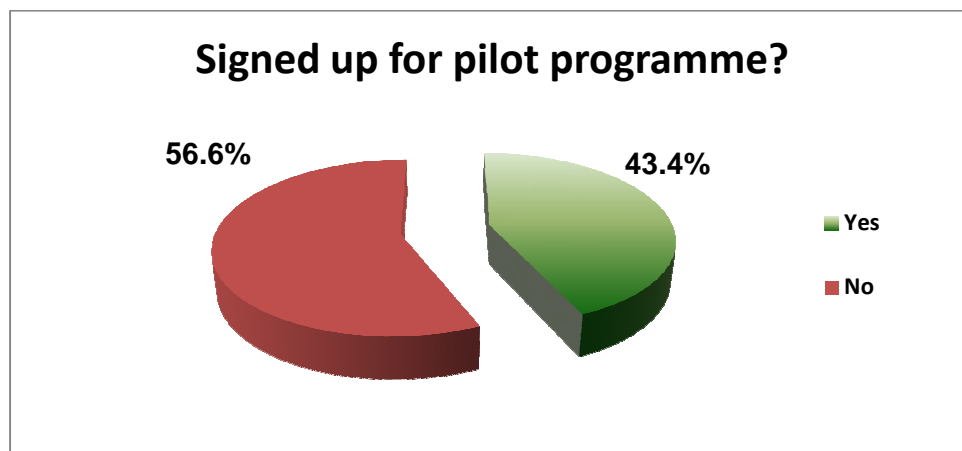
REASON	N
Not interested	1
Venues were inconvenient	1
Times were inconvenient	3
Forgot/lost information pamphlet	1
Language issues	1
Working circumstances	1
"It wouldn't make a difference"	1
Other reasons**	4
Total	13*

*Some of the respondents mentioned more than one reason.

**Being overseas at the time of the meetings; did not take invitation letter seriously; negative feelings towards Eskom.

The remaining 129 respondents (93.5% of the sample) who indicated having attended the information meeting were asked whether they had signed up to participate in the load management pilot programme.

QA5 Did you sign up to participate in the load management pilot programme?



The above figure shows that that less than half of the non-participants who attended the information meetings eventually signed up to participate in the load management pilot programme. Those who did not sign up (56.6%; n=73) were asked for the reason(s) why they had decided not to join the pilot programme (QA6). Their reasons are listed below.

Reason for not signing up for the pilot programme	N	%
1. Seldom at home; not available; didn't have the time	15	21.7
2. Health reasons/personal circumstances (baby in house, etc.)	13	18.8
3. It sounded like too much of a hassle; scepticism towards programme	11	15.9
4. Inefficient and poor Eskom management should solve power problem, not the public; it's Eskom's problem, not ours	7	10.2
5. Exemption-from-liability clause in contract was not acceptable	6	8.7
6. Inadequate information of programme/details too vague	4	5.9
7. Run a business from home; can't afford power interruptions	4	5.9
8. No reward for participation; too many risks involved	3	4.3
9. Household already saves lots of power; single-person household that already uses the minimum power	3	4.3
10. Programme did not cover changes to solar panel installations	3	4.3
Total	69	100

Most of the non-participants chose not to sign up either for **personal reasons** or owing to specific household circumstances (categories 1, 2, 7 and 9). Personal circumstances accounted for more than 50.7% of the all the reasons mentioned. **Programme-related reasons** (categories 3; 5; 6, 8 and 10) were pointed out in 39.1% of the cases, whereas **external reasons** – putting the blame and responsibility on Eskom – were mentioned in 10.2% of the cases.

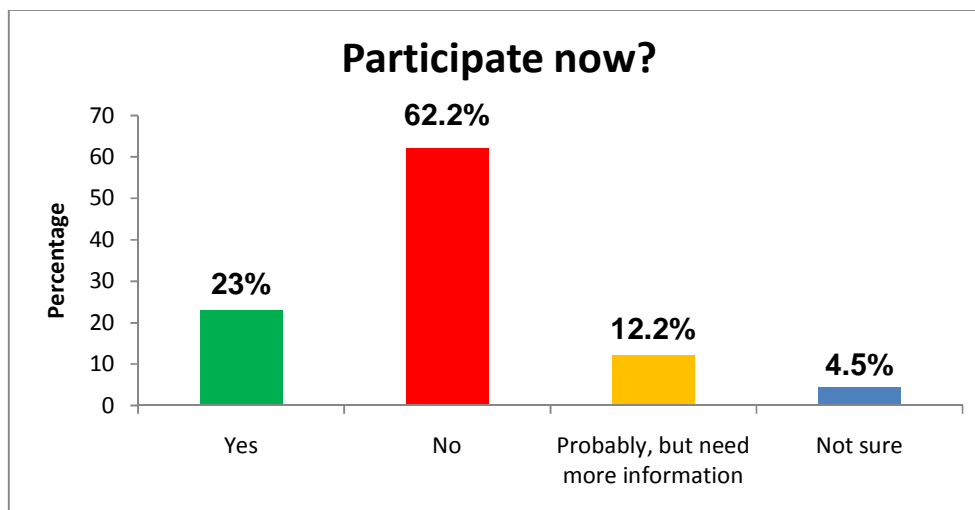
The remaining 43.4% (n=56) of the non-participants, who had signed up to participate in the pilot programme, were asked why they had not come to pick up a display device (QA7). One respondent in every four indicated that, contrary to the records, they had picked up the device, but that “Eskom never showed up to install it” or to “change the meters”. A further 16% stated that they had been too busy and had been unable to find the time to pick up the device, while 11% claimed that they had never been informed to go and collect the device. Approximately 20% of the non-participants supplied “technical” reasons for not picking up the device: 11% were unhappy with the indemnity clause that they were expected to sign,

and 9% pointed to the fact that their insurance companies did not approve of the device, presumably because it does not contain a lightning detector.

Reason for not picking up a display device	N	%
1. Did receive the Eddi, but Eskom did not come to install it or to change the meters	14	25.9
2. Too busy/did not have the time	9	16.7
3. Not satisfied with the indemnity clause/legal disclaimer	6	11.1
4. We were never asked to come and collect the device; did not know where to collect it	6	11.1
5. The device does not have a lightning protector – dangerous; insurance was not prepared to cover contents of the house if they had Eddi installed	5	9.3
6. Was overseas	5	9.3
7. Too many delays in the project – we lost interest	4	7.4
8. Do not understand the language/not fluent in English (Portuguese, Greek, French)	3	5.5
9. Have moved to another house	2	3.7
Total	54	100

Lastly, respondents were asked if, given another chance, they would participate in a next pilot programme, (QA8).

QA8 Would you participate now, given another chance?



Although almost a quarter of the non-participants indicated that, if given the opportunity, they would participate in a next pilot programme, the majority (62.2%) clearly indicated that they

would not be prepared to do it. Some 12% of the respondents said they would require more information about the programme before they could take such a decision. The nature of the “further information” that they needed included getting answers to questions such as “Who are the manufacturers?”; “How much will it cost?”; “Has the device proved itself yet?”; “What is the health risk?”; and “What are the benefits in joining the pilot programme?” Those who indicated that they would definitely not consider participation in the programme, were asked to provide a reason for their decision. These reasons are given below:

Reason for still not wanting to participate	N	%
1. Away from home too often; too busy	13	24.1
2. Not interested in programme; Programme sounds too much of a hassle	10	18.5
3. Electricity crisis is due to poor management and inefficiency on the part of Eskom/government; Eskom is giving electricity away to neighbouring countries; <i>They</i> should solve the problem, not the public.	9	16.7
4. Our household is already saving electricity/doing our bit	8	14.8
5. Indemnity clauses are problematic. Eskom will not accept responsibility for damage to owners' appliances.	5	9.2
6. Run a business from home; can't afford this type of disruptions	3	5.6
7. Living alone; does not see the necessity to install the device	2	3.7
8. Does not want to justify the idea of power shedding in his house	1	1.8
9. Other personal reasons	3	5.6
Total	54	100

The above table reveals that the initial reasons for not picking up the device still, to a large extent, serve as motivation why almost two-thirds of the non-participants still do not want to participate in the programme. Personal reasons still prevail in the vast majority of cases (too busy, not interested; living alone, etc). More than 16% of the respondents also expressed feelings of resentment, even antagonism, towards Eskom management or the government as primary reason for not taking part in the programme, while almost 15% believed that they were already doing their bit to save electricity.

5.3 Summary of findings (non-participants)

- ❑ **Finding 1: Awareness levels of the pilot programme among non-participants were very high, and the residents' newsletter and programme information letter reached more than three-quarters of this group as primary sources of information about the programme.**

More than 90% of the non-participants responded to the information contained in the newsletter and the information letter by attending the information meeting about the programme, which suggests that the primary objective of the information and awareness campaign – i.e. to reach and inform the target population - was successful.

- ❑ **Finding 2: Almost six out of every ten non-participants attending the information meeting, decided not to sign up for the programme, either for personal, programme-related or external reasons.**

A substantial proportion – more than 50% of the sample – cited personal reasons for not signing up, and it is doubtful whether any awareness and information campaign will successfully reverse this problem. However, when it comes to *programme-related* reasons for not signing up, issues such as concerns expressed regarding the indemnity clause and the lack of details about the programme do leave a window for intervention.

- ❑ **Finding 3: Misunderstandings and/or lack of communication resulted in a situation whereby a large number of those respondents who actually signed up for the programme either did not collect the device or did not install it.**

Some of the respondents indicated that – contrary to the records - they did indeed receive the device, but that nobody however came to their houses to install and activate it. A few households also claimed that they had never been informed to come and collect the device, or they had not known where to collect it.

- ❑ **Finding 4: Technical concerns about the programme and/or device deterred some households - who had initially signed up - from collecting the device.**

Two important concerns regarding the programme interlocked to prevent some people from participating in the pilot programme: (i) the fact that it was expected of participants to sign an indemnity clause that would leave them vulnerable in the case of any damages caused to

appliances; and, (ii) the perception that the device might pose an insurance risk to the household, especially since such households would forfeit their short-term insurance covering household contents when installing and using the device.

- ❑ **Finding 5: Although one respondent in every four indicated willingness to participate in the pilot programme if given another chance, almost two-thirds would still decline the opportunity, mostly for the same reasons that in the first instance prevented them from participating.**

Personal reasons (being too busy, away from home too often, living alone, etc.), a reluctance to sign the indemnity clause and some resentment towards Eskom management decidedly still deterred a substantial proportion of residents from participating in the programme.

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