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D3.3: Quantifying the behavioural change and energy savings – Year 1

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Executive Summary

Student Switch Off (SSO) is an inter-dormitory energy-saving competition run in dormitories managed by seventeen different university housing providers, housing 24,971 students in five countries over the academic years 2014/15 and 2015/16 (49,942 students in total over two years). Through a series of engagement activities and instruments students are enabled, empowered and motivated to save energy in their dormitories as a result of change in their energy behaviour.

SAVES evaluation assesses the effectiveness of the Student Switch Off campaign by both monitoring energy savings and human factors determining energy use. The approach and methods that have been used to conduct the impact assessment of the Student Switch Off campaign rely on the approaches and methods described in the common ICT-PSP methodology for Impact Assessment.

This deliverable (D3.3) presents an overview of the Student Switch Off evaluation methodology and the resulting energy savings and quantifiable behaviour changes relating to energy conservation that could be attributed to the project. The evaluation period is the academic year 2014-2015.

ENERGY SAVINGS

Monitored data for 2014-15 was collected and compared to the baseline data to find out how much energy was saved during the academic year that the Student Switch Off campaign was run and could therefore be attributed to the energy saving actions performed by students. Analysis was performed at project level, country level, and at dormitory provider level. Analysis of the control group located in Linkoping, Sweden, was also performed. Where dormitories were electrically heated or cooled, degree day analysis was performed. Where data for a month is missing or erroneous, it was extrapolated based on the average of the data available for other months.

In 2014-15, 1,525,238 kWh of energy were saved across all the participating countries. The majority of this saving was calculated based on direct meter readings. In a number of cases where data was missing or erroneous, it was extrapolated to ensure that all savings are reported.

Compared to the baseline, a 4.43% saving was achieved. Percentage wise, most energy was saved in Cyprus (6.92%), with the lowest savings reported in Lithuania (1.7%).

The energy saved, corresponds to saving of 620 tonnes of carbon dioxide and 131 tonnes of oil equivalent. Whereas in some countries there were high savings in kilowatt hours (e.g. Sweden), their carbon dioxide savings were very low because of the low carbon conversion factor (attributed to a clean electricity grid).

Table 1 Country specific and total kWh, percentage and carbon dioxide savings calculated from meter readings

	United Kingdom	Sweden	Lithuania	Greece	Cyprus	TOTAL
Baseline	15,388,587	1,980,515	3,774,526	1,850,909	194,705	23,189,242
Usage	14,6046	1,865,485	3,709,885	1,801,849	181,228	22,163,088
kWh saving	783,946	115,031	64,641	49,060	13,477	1,026,154
% saving	5.09	5.81	1.71	2.65	6.92	4.43
CO_2 savings (kg)	421,355	1,956	17,453	35,323	9,865	485,952

Table 2 Extra kWh and carbon dioxide savings extrapolated where data was missing or erroneous, per country and in total

	United Kingdom	Sweden	Lithuania	Greece	Cyprus	TOTAL
kWh saving	231,34	260,173	241	4,665	2,665	499,084
CO_2 saving (kg)	124,341	4,423	65	3,359	1,951	134,138

BEHAVIOUR CHANGE

All students in participating dormitories were encouraged to complete an incentivized online baseline survey (pre-intervention) at the start of the academic year, and a follow-up survey (post-intervention) closer to the end of the academic year. Only students that responded to the baseline survey could participate in the follow-up survey in order to be eligible for the pre- post- comparison evaluation. The survey was circulated in all the participating dormitories and in the control group in Linkoping, Sweden.

The findings of the questionnaire survey analysis are indicative of the impact that the Student Switch Off campaign has had on students and that has led to the reported energy savings.

A significant increase in the frequency that avoiding leaving electronic equipment on stand-by, putting a lid on pans when cooking, and boiling only the right amount of water is observed at the end of the academic year. The increase in the frequency of performance of those *energy saving actions* is in the range of 3-4%. In individual countries improvements are found in a number of actions. Statistically significant improvements are found in the frequency that lights are switched off in empty rooms in Cyprus, a lid is put on pans when cooking in Greece, and a lid is put on pans when cooking, the right amount is boiled with the kettle and extra layers are put on instead of the heating in Sweden.

Table 3 Changes in energy saving behaviours (country and project level)

Action	Cyprus	Greece	Sweden	UK	Total
Switch off lights in empty rooms	***6%**	3%	-1%	0%	0%
Avoid leaving electronic equipment on stand-by	11%	0%	4%	3%	***4%**
Put a lid on pans when cooking	-2%	***18%**	***6%**	1%	***3%**
Boil the kettle only with the amount of water you intend to use	2%	8%	***5%**	2%	***4%**
Put an extra layer on before deciding to turn on the heating	-2%	-2%	***6%**	-2%	1%
Open windows before deciding to use a cooling device or system	9%	0%	-1%	1%	1%

***statistically significant**

Overall, the *energy awareness* of students on what they can do to save energy in their dormitory has increased by "a little". The biggest increase in energy awareness is reported from Cyprus and the smallest from Lithuania.

Indicative of the increase in awareness is also the significant improvement of students' intention to have a more energy saving *lifestyle* after they move out of dormitories. This positive shift is large in all countries except for Lithuania where it is only marginal.

The top three *sources of information* that helped to increase the energy awareness of respondents are: family; an article they have read or a documentary they watched and; the Student Switch Off campaign. Student Switch Off receives a high proportion of responses and is in the top three most influential sources of information in all individual countries except for Sweden.

At the end of the academic year, respondents find it easier to reduce their energy use (*perceived behavioural control*). This could be due to the increase in their energy awareness and to the level of knowledge of what they can do to save energy in their dorms. Also, respondents think more that most people who are important to them try to pay attention to their energy use (*subjective norm*). A reason for this could be the fact that friends of the respondents living in the dorms are doing more to save energy as part of the campaign or because due to the increase of their energy awareness they are now more observant of family and friends acting in an energy efficient way.

At country level, a significant increase in the perception of how easily personal energy use can be reduced (*perceived behavioural control*) is found in Greece. An increase in the feeling of moral obligation to save energy (*personal norms*) is observed in Sweden. Also an increase in the perception of how easily personal energy use can be reduced (*perceived behavioural control*) and in the level that respondents think that the people who are important to them pay attention to their energy use (*subjective norm*) is also found in Sweden. In the UK an increase in the level that respondents think that the people who are important to them pay attention to their energy use (*subjective norm*) is also found.

The two most important *reasons for being more energy conscious* are: it is a habit students adopted from home, and it saves energy. The third reason in the top three list varies per country. In Cyprus, Greece and Lithuania the third reason is "it makes me feel good about myself" while is Sweden the third reason is "it helps reduce global warming" and in the UK it is "it's the right thing to do".

COMPARISON WITH CONTROL GROUP

Energy savings and questionnaire survey results from the control group -Studentbostäder in Linköping- were compared against the results of the treatment group in order to provide insight as to whether savings and behavior change achieved in the treatment group are significant and can be attributed to the Student Switch Off campaign. Only the Swedish SAVES dormitory providers (SGS and SSSB) were selected as the treatment group in order to be as similar as possible to the control dormitory buildings in ways that could affect energy use and energy related behaviours of the residents such as climate, architecture and lifestyle.

Differences between the two groups are determined through statistical comparison. Propensity score matching was not used for the matching of the two groups because energy data is per building and not per student.

Energy savings

Some energy saving at the level of 3% is reported in the control group, however, more energy was saved in the dormitories that had Student Switch Off intervention (6% savings).

Table 4 kWh, percentage and carbon dioxide savings in the control and treatment groups

	Control group	Treatment group
BASELINE	3,332,010	1,980,515
Usage	3,238,440	1,865,485
kWh reduction	93,570	115,031
% change	2.81	5.81
CO_2 savings (kg)	1,591	1,956

Sample characteristics

Ideally, demographic characteristics of the respondents of the two groups should be as similar as possible in order to act as a form of matching. Nonetheless, significant differences are found in the demographic characteristics of the two groups. Only in gender the differences are not significant.

Behaviour change

Overall, changes are observed in both the treatment and the control group. The level of change is indicative of the results for energy savings; change is found in both the treatment and the control group, but the change is more positive in the treatment group.

A positive shift towards an intention to make more energy saving efforts when they move out of dormitories is observed in both groups, but like with the energy savings reported, this increase is more profound for the treatment group.

A slight decrease in the level of information on what respondents personally consume in their dormitory is observed in both groups. This decrease is again marginally larger in the control group. The level of knowledge is at similar levels in the two groups and close to "badly informed". For the treatment group, this is expected to change in Year 2 of the campaign where more detailed energy consumption feedback will be provided.

Significant increase is found in the level of information on what respondents can do to save energy in their dormitory in both the treatment and the control group. This change is larger for the treatment group.

An increase in energy awareness on what they can do to save energy in their dormitory is reported from respondents in both groups. Differences in the mean values between the two groups are statistically significant but the reported increase in the treatment is greater than in the control group.

The top three sources of information that helped increase energy awareness are common between the treatment and control group. Those are: an article/documentary; family, and; a university course. The

Student Switch Off campaign has influenced 12% of the respondents of the treatment and only 3% of the control group.

As far as habits are concerned a significant increase is observed in the treatment group for the action of putting a lid on pans when cooking, for boiling only the right amount of water and putting extra layers on instead of the heating. This increase is in the range of 5-6%. In the control group a significant decrease occurred in the frequency that lights are switched off in empty rooms. A significant increase is observed only in the frequency that the right amount of water is boiled in the kettle for the control group and it is at the level of 5%.

A common trend is observed in the mean values for the items of behavior change theory and models between the two groups. Significant changes are observed in some of the items in both groups, but are more positive and more profound in the treatment group.

In the treatment group an increase in the feeling of moral obligation to save energy is observed. An increase in the perception of how easily personal energy use can be reduced and in the level that respondents think that the people who are important to them pay attention to their energy use are also found in the treatment group. An increase in the perception of how easily personal energy use can be reduced is observed in the control group as well. Nonetheless, the perception of how easily personal energy use can be reduced is stronger in the treatment group. Finally, a decrease in the level of impact of energy saving on emotions is observed in the control group.

The three most important drivers of energy consciousness are common between the treatment and control group: it's a habit adopted from home; it saves energy, and; it helps reduce global warming. The three most important drivers remain unchanged from the those reported in the baseline survey. No significant differences are observed in the ranking of drivers of energy consciousness between the treatment and control groups but it is worth noticing, that the proportion of respondents from the treatment group selecting the "it saves energy" option is 13% higher than the one in the control group.

The three most important barriers to saving energy are also common for the treatment and control group. Those are: lack of energy consumption feedback; structural/system limitations, and; energy saving does not save them money. Overall, no significant differences are observed in the ranking of barriers of energy consciousness between the two groups or between the baseline and follow-up survey.

The least important reasons for being less energy conscious are also common between the treatment and the control group. Those are: sustainable living not being for them, fear of being made fun of and lack of inspiration from the university/college to act in an energy saving manner.

THINGS TO CONSIDER IN YEAR 2

Some of the findings of the questionnaire survey analysis are important for consideration in Year 2 of the campaign, at project level or at country level, as they can help shape the campaign to meet students' needs and preferences and therefore lead to more student engagement and energy savings.

At the end of year 1, respondents feel less in control over how much energy they use (perceived behavioural control). This could be attributed to the lack of energy consumption feedback but also to barriers such as structural or system limitations of the dorms. Also, respondents think less that energy conservation contributes to a reduction in climate change impacts (awareness of consequences). The mean values indicate high awareness of consequences in both the baseline and the follow-up survey, yet more effort should be put in year 2 in increasing awareness of consequences. Finally, respondents think less that as residents of a dormitory they should be more concerned about their energy use there (role beliefs). This may be because they feel they are already doing a lot to save energy or because they think that everyone including dormitory managers should be doing more to save energy in their dormitories.

At country level, a decrease in the role belief that as residents of dormitories respondents should be more concerned about their energy use, is found in Cyprus. In Lithuania a significant decrease in the ascription of responsibility for climate change and in the intention to save energy in the coming academic year is found. Finally, in the UK respondents appear less aware of consequences from energy consumption at the end of the academic year, however, the mean values indicate high awareness of consequences. A decrease is also found in the perception of control over personal energy use and in the role belief that as residents of dormitories respondents should be more concerned about their energy use. In any case, the exact reasons for the less positive attitude towards these issues, at both project and at country level, should be investigated and improved in year 2, where possible.

Others asking respondents to save energy, earning prizes out of it, gaining approval of other people and fitting in with other energy conscious residents of the dormitory seem to have minimal impact on respondents' energy consciousness in all individual countries.

The top reasons for being less energy conscious vary between countries. Only the lack of energy consumption feedback has a common ranking in all countries and it is in fact the number one reason for being less energy conscious. In fact, in all countries the level of information on what students can do to save energy in their dorms is noticeably higher than the level of information on what they actually consume. This is due to the fact that in year 1 students were very well informed on actions they can take to save energy, but the energy consumption feedback provided was more basic. In year 2 where more detailed energy consumption information will be provided, the level of information on what students actually consume is expected to increase and help achieve more savings.

1. Introduction

Student Switch Off (SSO) is an inter-dormitory energy-saving competition run in 475 dormitories managed by seventeen different university housing providers, housing 24,971 students in five countries over the academic years 2014/15 and 2015/16 (49,942 students in total over two years).

Through a series of engagement activities and instruments students are enabled, empowered and motivated to save energy in their dormitories as a result of change in their energy behaviour.

The project encourages any action that can help save energy with specific attention given to six energy conservation actions:

- Switch off lights
- Switch off appliances
- Don't overfill the kettle
- Put a lid on the pan when cooking
- Put on more layers, not the heating
- Try ventilation through open windows before using a cooling device.

This deliverable (D3.3) sits within Work Package 3 and has been developed according to the requirements and services that have been defined and developed in previous work packages (see Figure 1). D3.3 presents the energy savings and quantifiable behaviour changes relating to energy conservation that could be attributable to the project.

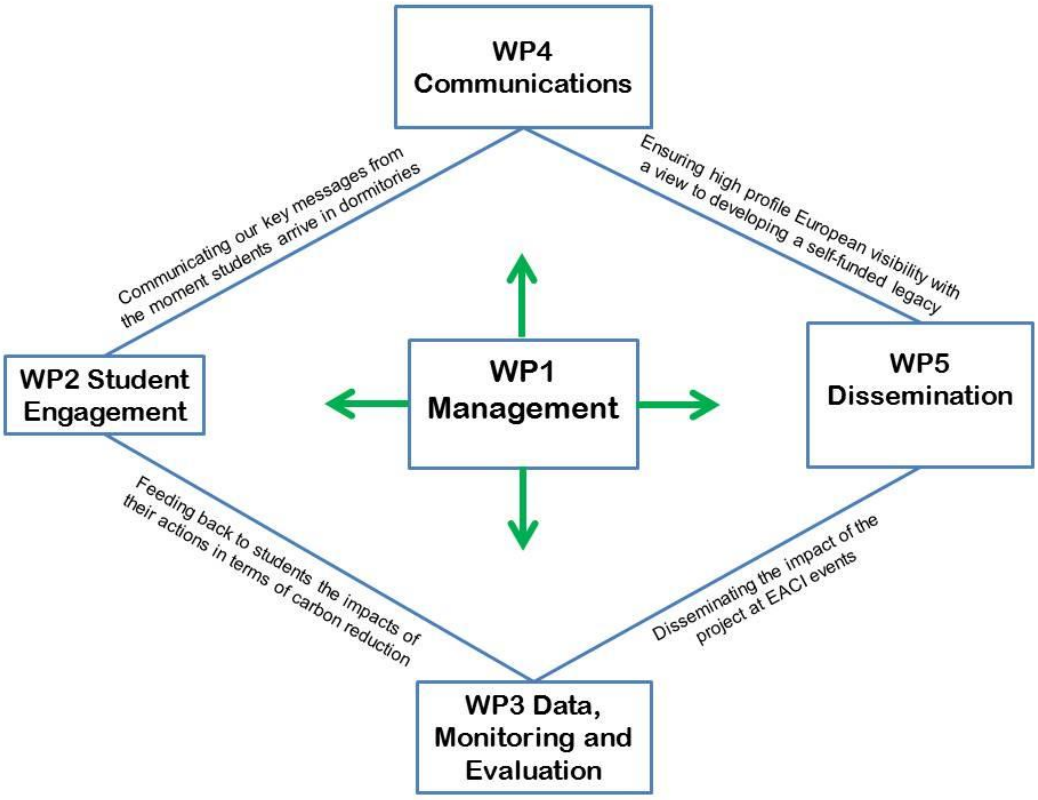

Figure 1 Overview of the SAVES project

The evaluation methodology aims to provide proof for the achievement of some of the project's most important objectives:

- 8% average reduction of electricity usage, compared to baseline year, across participating dormitories
- 4.23GWh electricity-savings (1,902 tCO_2e / 363toe) achieved, compared to baseline year, across participating dormitories, over both academic years

- Quantifiable behaviour change delivered in students, with 10% swings on target behaviours (e.g. students switching off the lights when not in use) between surveys. Ninety percent of students state they have carried forward the energy-saving habits learnt in the project into private accommodation once they have left dormitories
- 2.85 GWh estimated energy savings (998 tCO_2e/year / 245 toe) from students carrying forward their energy-saving habits into private accommodation.

2. Impact Assessment Methodology

While technical efficiency improvement in energy use remains a key way of curbing greenhouse gas (GHG) emissions, there is concern about whether this approach is, on its own, sufficient to counteract the growing impact of human actions. Work to investigate this has found that energy efficiency improvement measures can have mixed effects unless they are also accompanied by adjustments in human behaviours[1]. As a result, the SAVES evaluation will assess the effectiveness of the Student Switch Off campaign by both monitoring energy savings and human factors determining energy use, as this "may increase our understanding of the success or failure of intervention programs"[2].

This section details the approach and methods that were used to conduct the impact assessment of the Student Switch Off campaign in Year 1 of implementation.

2.1 Evaluation methodology overview

The effectiveness of the Student Switch Off campaign is evaluated through the level of achieved:

a) Energy savings
b) Behaviour swings

These are estimated with the help of the following means:

1. *Baseline energy use*

Consumption data collected at each dormitory in the baseline period is used to establish consumption models. Baseline energy data is pre-intervention consumption data. This may be utility bill data or metered data.

2. *Monitored energy use*

During the running of the Student Switch Off campaign monthly consumption data is collected either manually or automatically via smart meters.

3. *Baseline questionnaire survey*

All students in participating dormitories are encouraged to complete an incentivized online baseline survey (pre-intervention survey) before their local energy-saving campaigns are established, so as to capture existing energy-saving attitudes, behaviours and habits.

4. *Follow-up questionnaire survey*

All students that completed the baseline survey are encouraged to complete a follow-up survey (post-intervention survey) close to the end of the academic year. Pre- and post-competition surveys are analysed and compared to identify attitudinal, behavioural and habitual changes relating to energy conservation that could be attributed to the project.

[1] L Adua, 'To Cool a Sweltering Earth: Does Energy Efficiency Improvement Offset the Climate Impacts of Lifestyle?', *Energy Policy*, 38 (2010), 5719–5732
[2] W Abrahamse and others, 'A Review of Intervention Studies Aimed at Household Energy Conservation', *Journal of Environmental Psychology*, 25 (2005), 273–291 (p. 283)

In the second year, questionnaire surveys will also be conducted with students who lived in participating dormitories in 2014/15 and moved into private accommodation to identify whether the energy-saving actions established during their time in dormitories have been carried forward.

2.2 Study Methodology

2.2.1 Objectives

The evaluation methodology will provide proof of the achievement of the following project targets:

- 8% average reduction of electricity usage, compared to baseline year, across participating dormitories
- 4.23GWh electricity-savings (1,902 tCO_2e / 363toe) achieved, compared to baseline year, across participating dormitories, over both academic years
- Quantifiable behaviour change delivered in students, with 10% swings on target behaviours (e.g. students switching off the lights when not in use) between surveys. 90% of students state they have carried forward the energy-saving habits learnt in the project into private accommodation once they have left dormitories
- 2.85GWh estimated energy savings (998tCO2e/year / 245 toe) from students carrying forward their energy-saving habits into private accommodation

2.2.2 The sampling frame

The sampling frame for the calculation of energy savings consists of dormitory buildings used as university student accommodation in 5 different European countries: Cyprus, Greece, Lithuania, Sweden and the UK. Where possible, control buildings (control group) will also be considered for each of the participating countries.

The sampling frame for the questionnaire surveys consists of students living in student accommodation in five different European countries: Cyprus, Greece, Lithuania, Sweden and the UK. Where possible, a control group will also be considered for each of the participating countries.

2.2.3 Study Design

The most suitable design approach for behaviour based efficiency projects is the Randomized Controlled Trial (RCT) approach where participants are randomly allocated to treatment and control groups. The RCT approach is not feasible in this project; therefore, depending on the availability of a control group, the following two approaches will be used to determine the impacts of the competition:

a) the pre-post energy use method
b) the matched control group method.

A. Pre-Post Energy Use Method

In this approach, the energy use of participating buildings is compared to their historical energy use (pre-intervention energy use). Pre- post-comparison will also be performed for all of the identified independent variables measured through the questionnaire survey for each country meaning that each building is its own non-random control group.

A simple pre-post comparison without weather and occupancy adjustments is not recommended, and will be used only where baseline energy data is not available.

B. Matched Control Group Method

Controls will not be selected by random sampling, but rather by matched sampling. The idea is to choose control dormitory buildings which are as similar as possible to treatment dormitory buildings in ways that could affect energy use and energy related behaviours of the residents. As a result, groups should be similar in, as much as possible, the following ways:

- Resident characteristics:
  - Demographics. Demographic profiles should be similar.

    - Studies. Group should be taking similar courses/subjects to those of the treatment group as these affect their energy-related knowledge and skills.
- Green initiatives:
    - Past green initiatives. Both groups should either have or not have been involved in energy saving initiatives during the baseline period.
    - Future green initiatives. The control group should not receive any energy saving intervention (building renovation or information campaign on energy saving etc) for the entire duration of the SSO competition (monitoring period).

For each control dormitory building the following energy consumption data should be available:

- Historical electricity consumption data for academic year 2013/2014, preferably monthly (or even shorter interval) data.
- Electricity consumption data for academic year 2014/2015, at same or shorter time intervals as for the historical consumption data.

Residents of the control group dormitory buildings must also take part in the pre- and post-intervention questionnaire surveys.

2.2.4 Data Collection

2.2.4.1 Data Requirements

For both approaches data requirements are the same. Where the matched control group method is followed data should also be provided for the control group in order to help determine changes attributed to the campaign, and whether the treatment and control group are comparable in their observable traits. For each of the dormitory buildings (treatment and control group) the following data is required:

1. Monthly total electricity use data (kWh):
    a) For the baseline period (at least 12 months prior to the establishment of the competition). These may be utility bill data or metered data.
    b) For the monitoring period (monthly, or shorter interval data, for the period that the competition took place in the dormitory). These should be monitored data. Where meters have not yet been installed, but also for the case of the control group, data may come from utility bill data.
2. Degree Days for the time period considered for the energy data (i.e. weekly, monthly, bimonthly)
3. Occupancy data. To be able to present the energy use and savings as kWh/resident.
4. Questionnaire survey data

2.2.4.2 Instruments and procedures

Energy information sheet

An energy information sheet template is provided to help collect energy consumption, degree day and occupancy data for the baseline and monitoring period (see D3.2). The template also allows for the inclusion of notes related to major infrastructure change that may affect electricity usage. This information is collected by the dormitory managers.

The questionnaire survey

The questionnaire survey contains questions covering the following topics, and the majority of questions are common for both the baseline and follow-up survey:

- Demographics. To determine the basic demographic characteristics of the sample namely: age, gender, nationality, subject of studies and level of studies.
- Energy related lifestyle and information levels. To determine the (self-reported) energy related knowledge but also the energy related lifestyle and intention to change it.
- Energy awareness. To determine the level of increase in energy awareness and the means that caused it.
- Psychological, Social and Behavioural aspects. To identify drivers of pro-environmental behaviours.
- Habits. To identify behaviour patterns and opportunities for promoting energy efficiency.
- Opportunities/determinants of energy saving. To identify incentives and barriers for energy saving.

The baseline questionnaire survey template and results were reported as part of deliverable D3.2.

A copy of the follow-up survey is found in Appendix A and findings are reported as part of this deliverable.

The questionnaire survey is translated in all participating country languages (English, Greek, Lithuanian and Swedish). An online version is created for each of the translated versions with the help of SurveyMonkey software[3].

The link to the online survey is circulated to students via email. The baseline survey was circulated at the beginning of the academic year and before the launch of the competition (pre-intervention), while the follow-up survey was performed closer to the end of the competition and end of the academic year (post-intervention).

The target response rate for the baseline survey was 15%, while 15% of 15% of the number of students participating in SAVES was targeted for the follow-up survey. In order to ensure engagement, a €100 1st cash prize, and 3 x €25 were offered as project wide incentives in both surveys, while country specific incentives were also offered for the baseline survey (i.e. additional cash draw or chocolate).

2.2.5 Study Variables

Energy use and energy savings may be driven by demographic variables, socio-psychological variables, such as attitudes, values and norms, habits, knowledge but also opportunities or barriers of structural or other nature.

The variables considered for the impact assessment of the Student Switch Off campaign are explained below.

2.2.5.1 Dependent variables

Energy use

For the baseline period total electricity use was calculated based on billing or metered data. This data was reported as part of deliverable D3.2.

Energy Savings

Energy savings were caclulated at the end of the academic year using the pre-post or the matched control group approach for the duration of the competition in each dormitory. Savings are reported in this deliverable.

2.2.5.2 Independent variables

Demographics

Demographic factors are considered to have an impact on energy use and energy savings. The variables most relevant for this project are considered to be the following:

- Age
- Gender
- Nationality
- Subject of studies
- Level of studies

Lifestyle

Residents of dormitories are very likely to have a much different lifestyle in relation to energy consumption than if they were living in private accommodation in which they would have to pay for their own bills based on what they consume. One item measures the intention to change current energy related lifestyle when moving into private accommodation.

- *Future lifestyle and energy saving*

The item was measured on a 6-point scale 1 'I think I'll be doing a lot more to save energy' to 5 'I think I'll be doing a lot less to save energy' and 6 'Don't know'.

(Perceived) level of information

Two items were used to measure the level of (perceived) information with energy saving issues: information about possibilities to save energy in dormitories and; information about own consumption in

[3] www.surveymonkey.com

the dormitories. Responses were given on a five-point scale, with scores ranging from 1 'Very badly informed' to 5 'very well informed'. Lower scores show lower levels of information on own energy consumption.

Energy awareness
Two extra questions were included in the follow-up survey as a way of self-evaluating the change and sources of impact in their energy awareness. Two items were used to measure the increase in energy awareness.

- *Increase of energy awareness*

Increase of awareness on the impact of lifestyle and habits on energy consumption was evaluated on a five-point scale, with scores ranging from 1 'a great deal' to 5 'not at all'. This question allows for a direct, yet subjective, self-evaluation of the respondents as regards to their energy awareness and whether this has increased in the past academic year.

- *Sources of information that helped increase energy awareness*

A list of sources of information that can help increase energy awareness was provided. Respondents could select as many sources as they thought relevant. This helps identify in a direct way the sources of information that respondents were exposed to in the evaluation period and may have resulted in an increase of their energy awareness.

Socio – psychological variables
Variables capable of inducing behaviour change from the Norm Activation Model[4] (NAM), the Theory of planned behaviour[5] (TPB) and the Triandis' Theory of Interpersonal Behavior [6] (TIB) have been selected (see Appendix B). Responses are given on a five-point scale with scores ranging from 1 'Strongly disagree' to 5 'Strongly disagree'. Namely, items from the following variables are studied:

- *Personal norm (PN)*

Norms defined as the perceived social pressure to perform or not to perform the behaviour in question.
Two items were used to measure Personal norm ("I feel morally obliged to save energy" and "I feel guilty when I use a lot of energy").

- *Ascription of Responsibility (AR)*

Ascription of responsibility reflects the feelings of responsibility for the negative consequences of not engaging with the behaviour in question. One item was used to measure ascription of responsibility ("Everyone including myself is responsible for climate change").

- *Awareness of consequences (AC)*

Awareness of consequences reflects the extent to which an individual is aware of the negative consequences from not engaging with the behaviour in question. Awareness of Consequences was measured with one item ("Energy conservation contributes to a reduction of the climate change impacts".

- *Attitudes (ATT)*

Attitude refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behaviour in question. Two items were used to measure respondents' attitudes toward energy saving ('Saving energy is too much of a hassle' and 'Saving energy means I have to live less comfortably").

- *Perceived Behavioural Control (PBC)*

Perceived behavioural control refers to the perceived ease or difficulty of performing a behaviour and is assumed to reflect past experience as well as anticipated impediments and obstacles.
Perceived behavioural control was measured through two items: an item measuring self-efficacy ("I can reduce my energy use quite easily") and an item measuring controllability ("I feel in complete control over how much I use").

- *Subjective norms (SN)*

[4] S.H. Schwartz. *Normative influences on altruism*. In L. Berkowitz (Ed.), Advances in experimental social psychology, Vol. 10 Academic Press, New York (1977), pp. 221–279
[5] Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179-211.
[6] H. Triandis, Interpersonal Behavior, Brooks/Cole Pub. Co, 1977.

Subjective norm tries to explain the opinions that others may have about the behaviour. It was measured through two items. The injunctive item ("Most people who are important to me think that I should use less energy") measures respondents' perceptions of what they believe others would want them to do regarding energy saving while the descriptive item ("Most people who are important to me try to pay attention to their energy use") measures the extent to which respondents believe that people that are important to them try to pay attention to their own energy use.

- *Emotions (EMO)*

Emotional reactions towards a given behaviour are considered capable of changing that behaviour. Emotions were measured through one item ("Doing things to save energy makes me happy").

- *Role beliefs (ROL)*

Roles are 'sets of behaviours that are considered appropriate for persons holding particular positions in a group'[7]. Role beliefs were measured through one item ("As a resident of the dorms I should be more concerned about my energy use during my stay there").

- *Intention (INT)*

Intentions are considered immediate antecedents of behaviour. Intention was measured through one item ("I intend to try harder to reduce my energy use this/the following academic year").

Habits
A habit is a routine of behaviour that is undertaken at "low levels of consciousness" (i.e. switching off lights in unoccupied rooms). The frequency that each of the six target behaviours is undertaken was measured on a five-point scale with scores ranging from 1 'Never' to 5 'Always'. The higher the score the greater the habit strength.

Opportunities/determinants of energy saving
Situational constraints and conditions but also social and affective factors influence behaviours and intentions to save energy. Incentives and barriers for energy saving are measured through the following questions:

- Incentives

A list of possible reasons for being more energy conscious was provided. The three most important reasons should be selected. This helps identify possible incentives that support energy efficient behaviour and therefore where the project activities should emphasise on.

- Barriers

A list of possible reasons for being less energy conscious was provided. The three most important reasons should be selected. This helps identify the barriers to energy saving and therefore where effort should be put by the project for removing them.

2.2.6 Data analysis

Analysis of energy data
Consumption data collected at each dormitory in the baseline period is used to establish consumption models. These models will provide a basis for comparison over the project period to quantify energy savings. This data was reported as part of deliverable D3.2.

Throughout 2014-15 data was collected for each of the participating dormitories and compared to the baseline data to find out how much energy was saved by students through their energy saving actions. Where dormitories were electrically heated or cooled, degree day analysis was performed. Where data for a month is missing or erroneous, it is extrapolated based on the average of the data available for other months.

In this report energy savings are presented in:

[7] Triandis, H., 1977. Interpersonal behaviour. Monterey, CA: Brookds/Cole.

- kilowatt hours (kWh saving),
- percentage savings (% saving),
- carbon dioxide (kg CO_2).

Analysis is performed at project level, country level, and at dormitory provider level. Data from the control group is also presented.

Analysis of questionnaire data
Descriptive statistics are used to describe the basic attributes of the sample at project level and at country level.

Chi-square test is used to determine any significant differences between countries and between the treatment and control group. Paired samples t-test is used as a pre- post-comparison test to determine significant changes between the baseline and follow-up survey.

3. Energy data analysis & results

Baseline energy data was collected from each of the seventeen dormitory providers at the start of the 2014-15 academic year. The data collected was from September'13 through to June'14 in the majority of the cases; in dormitory providers where SSO was run in years prior to 2014-15, the baseline was formed from the year prior to the campaign starting. This data was reported as part of deliverable D3.2.

Throughout 2014-15 data was collected for each of the participating dormitories and compared to the baseline data to find out how much energy was saved by students through their energy saving actions. Where dormitories were electrically heated or cooled degree day analysis was performed. In a small number of cases were data for a month was missing or erroneous, it was extrapolated based on the average of the data available for other months. The savings were then fed back to students either on a termly basis, or in the case of Swedish dormitories on a weekly basis. For the majority of dormitory providers eight months' worth of data was compared, in a few dormitories nine months' worth of data was used. Moving forward in 2015-16 energy savings will be fed back through the energy dashboard currently developed by project partner DMU.

In this report energy savings are presented in kilowatt hours (kWh saving) and as percentage savings (% saving). The data is also converted into carbon dioxide (kg CO_2) through using country specific carbon conversion factors. The chapters below present overall savings, per country, and per dormitory provider. Data from the control group are also presented.

3.1 Europe wide savings

In 2014-15, 1,525,238 kWh of energy were saved across all the participating countries. This equates to a 4.43% saving compared to the baseline and a saving of 620 tonnes of carbon dioxide and 131 tonnes of oil equivalent. The majority of this saving was calculated based on direct meter readings (Table 5). In a number of cases where data was missing or erroneous, it was extrapolated to ensure that all savings are reported; Table 6 illustrates the additional kilowatt hours and carbon dioxide that project is expected to have saved.

Table 5 Project kWh, percentage and carbon dioxide savings calculated from meter readings

	Total
Baseline	23,189,242
Usage	22,163,088
kWh saving	1,026,154
% saving	4.43
CO_2 saving (kg)	485,952

Table 6 Extra kWh and carbon dioxide savings extrapolated where data was missing or erroneous

	TOTAL
kWh saving	499,084
CO_2 saving (kg)	134,138

3.2 Country specific savings

Overall percentage and kilowatt hour savings were calculated for each of the five participating countries, in addition to carbon dioxide savings. Tables 7 and 8 show per country savings. It is important to note that each dormitory is a different size, therefore some had much bigger absolute kilowatt hour savings than others. Carbon dioxide savings are based on carbon conversion factors in participating countries – it is interesting to note that whereas in some countries there were high savings in kilowatt hours (e.g. Sweden), their carbon dioxide savings were very low because of the low carbon conversion factor (attributed to a clean electricity grid). In contrast the opposite can be said about Cyprus and Greece, that had smaller kilowatt hour savings due to small sizes of dormitories, yet their carbon dioxide savings were high proportionally.

Percentage wise, most energy was saved in Cyprus (6.92%), with the lowest savings reported in Lithuania (1.7%). UK had the highest absolute energy savings (1,015,286 kWh), with the lowest reported in Cyprus (16,142 kWh). UK also had the highest carbon dioxide savings (545,696 kg CO_2) whereas the lowest was reported in Sweden (6,370 kg CO_2).

Table 7 Country specific kWh, percentage and carbon dioxide savings based on meter readings

	United Kingdom	Sweden	Lithuania	Greece	Cyprus
Baseline	15,388,587	1,980,515	3,774,526	1,850,909	194,705
Usage	14,604642	1,865,485	3,709,885	1,801,849	181,228
kWh saving	783,946	115,031	64,641	49,060	13,477
% saving	5.09	5.81	1.71	2.65	6.92
CO_2 savings (kg)	421,355	1,956	17,453	35,323	9,865

Table 8 Extra kWh and carbon dioxide savings extrapolated where data was missing or erroneous, per country

	United Kingdom	Sweden	Lithuania	Greece	Cyprus
kWh saving	231,340	260,173	241	4,665	2,665
CO_2 saving (kg)	124,341	4,423	65	3,359	1,951

3.3 Dormitory provider specific savings

Detailed energy analysis was performed on energy data of each participating dormitory provider. The results are presented in Tables 9 and 10. The biggest kilowatt hour saving (based on figures in Tables 9 and 10) can be noted in SGS (Sweden), where 348,027 kWh were saved The biggest percentage saving has been at SGS (Sweden) where a 25.41% is noted. The most carbon dioxide was saved in UWE (UK) (129,082 kg CO_2).

Table 9 Dormitory provider specific kWh, percentage and carbon dioxide savings based on meter readings

	Baseline	Usage	kWh saving	% saving	CO2 saving (kg)

QMUL	2,849,317	2,705,087	144,23	5.06	77,521
Bath	3,223,210	3,026,156	197,054	6.11	105,912
Cranfield	1,321,012	1,262,950	58,062	4.40	31,207
UWE	1,472,382	1,363,630	108,752	7.39	58,452
Worcester	616,768	577,223	39,545	6.41	21,255
Northampton	1,317,333	1,256,265	61,068	4.64	32,823
DMU	4,588,565	4,413,330	175,235	3.82	94,185
Athens	1,692,065	1,656,083	35,981	2.13	25,907
TUC	158,844	145,766	13,078	8.23	9,416
Cyprus	194,705	181,228	13,477	6.92	9,865
SSSB	1,627,767	1,602,353	25,415	1.56	432
SGS	352,748	263,132	89,616	25.41	1,523
VU	1,227,742	1,253,281	-25,538	-2.08	-6,895
VGTU	1,552,217	1,519,763	32,454	2.09	8,763
VTDK	49,79	471,908	25,992	5.22	7,018
VKK	8,569	8,207	3622	4.22	977
KVK	356,541	329,775	26,766	7.51	7,227
Total	23,189,242	22,163,088	1,026,154	4.43	485,952

Table 10 Extra kWh and carbon dioxide savings extrapolated where data was missing or erroneous, per dormitory provider

	kWh saving	CO2 saving (kg)
QMUL	53,016	28,495
Bath	-	-
Cranfield	-	-
UWE	131,41	70,63
Worcester	8,873	4,769
Northampton	-	-
DMU	38,041	20,446
Athens	4,665	3,359
TUC	-	-
Cyprus	2,665	1,951
SSSB	1,762	30
SGS	258,411	4,393
VU	-5,382	-1,453
VGTU	3,920	1,058
VTDK	-	-
VKK	-	-
KVK	1,703	460
Total	499,084	134,138

3.4 Control group savings

Energy savings from the Swedish SAVES dormitory providers (SGS and SSSB) – treatment group - were compared to energy savings in the Swedish control group -Studentbostäder in Linköping- (Table 11). There was some reported energy saving in the control group, however, more energy was saved in the dormitories that had SSO intervention. The control group had 3% savings, whereas the treatment group had 6% savings.

Table 11 kWh, percentage and carbon dioxide savings in the control and treatment groups

	Control group	Treatment group
BASELINE	3,332,010	1,980,515
Usage	3,238,440	1,865,485
kWh reduction	93,570	115,031
% change	2.81	5.81
CO2 savings	1,591	1,956

4. Questionnaire analysis and results

4.1 Survey response rate

The follow-up student questionnaire survey was circulated in all countries participating in the project. In addition to the dormitories where SSO is implemented, the survey was also circulated in the control group in Linkoping, Sweden. Only students that respondent to the baseline survey in the beginning of the academic year were eligible to participate in the follow-up survey.

Respondents to the follow-up survey, were matched with the respondents of the baseline survey through their email or name in order to be included in the pre- post- comparison evaluation. Respondents that did not provide this information were excluded from this analysis.

The total **response rate** for the follow-up survey is 615 and it is the 15% of 15% of the number of students participating in SAVES (0.15*0.15*27,337=615). The response rate target has been achieved with a total of 613 matched respondents (Table 12).

Table 12 Survey response rate

	Cyprus	Greece	Lithuania	Sweden	UK	Sweden CG	Total
Students participating in SAVES (count)	208	1142	7171	3171	13,279	2406	**27,377**
Target responses for follow-up survey (count)	5	26	161	71	299	54	**615**
Valid responses to follow-up survey (count)	14	17	38	222	155	167	**613**

Respondents live in dormitories in five different countries (

Table 1313). Respondents from seventeen dormitory providers took the survey. Seven of these are in the UK, five in Lithuania, three in Sweden, two in Greece, one in Cyprus. From the three Swedish

dormitory providers, two are implementing the Student Switch Off campaign while one housing provider participates as provider of the control group.

Table 13 Universities and dormitory providers participating in the survey

Country	Dormitory provider
Cyprus	University of Cyprus
Greece	University of Athens Technical University of Crete
Lithuania	Vilniaus Gedimino technikos universitetas Vilniaus universitetas Klaipedos valstybine kolegija Vilniaus technologiju ir dizaino kolegija Vilniaus kooperacijos kolegija
Sweden	SSSB in Stockholm SGS Studentbostäder in Göteborg
Sweden, Control Group	Studentbostäder in Linköping
UK	University of Bath Cranfield University De Montfort University The University of Northampton Queen Mary, University of London University of West of England University of Worcester

4.2 Results: Dormitories implementing Student Switch Off

4.2.1 Respondent characteristics

A significantly large number of female, compared to male respondents participated in the survey. Fifty seven percent of the respondents are female and 40% are male. The biggest proportion of female respondents is found in Cyprus (79%). In all countries except for Greece the number of female respondents is bigger than the male respondents. Differences found between countries in gender are not statistically significant ($\chi^2(12)=13.425$, $p=.339$).

Significant differences are found across countries in the age of the respondents ($\chi^2(8)=43.231$, $p<.001$). The biggest majority of respondents is between 17-24 years of age in all countries (79% of total). In fact, in Cyprus and Lithuania 100% of respondents are in this range. In Sweden, a large number of respondents (31%) is also in the range of 24-35 years. Sweden and the UK are the only countries with respondents at the age or over 35 years. However, this percentage is very small (1% and 3%, respectively).

The majority of respondents are native to the country they study in (65% of total). Across individual countries significant differences are found in nationality ($\chi^2(8)=39.133$, $p<.001$). In Greece and Lithuania all respondents are native to the country they study in. In the UK and Sweden a significant number of international, non-EU citizens, is met (22% and 18%, respectively).

Table 14 Respondent demographics (follow-up survey)

	Cyprus	Greece	Lithuania	Sweden	UK		Total
Gender							

	Male	21%	53%	42%	42%	38%		**40%**
	Female	79%	47%	58%	53%	61%		**57%**
	Other	0%	0%	0%	1%	0%		**1%**
	Prefer not to say	0%	0%	0%	4%	1%		**2%**
Age								
	<17 years	0%	0%	0%	0%	0%		**0%**
	17-24	100%	88%	100%	68%	88%		**79%**
	24-35	0%	12%	0%	31%	10%		**19%**
	>=35	0%	0%	0%	1%	3%		**2%**
Nationality								
	Native	79%	100%	100%	59%	61%		**65%**
	EU citizen	21%	0%	0%	23%	17%		**18%**
	non-EU citizen	0%	0%	0%	18%	22%		**17%**
Year of study								
	1st Year University	0%	0%	34%	16%	69%		**35%**
	2nd Year University	7%	6%	24%	20%	2%		**13%**
	>2nd Year University	79%	82%	39%	23%	4%		**22%**
	PGr - Masters	14%	6%	3%	33%	21%		**25%**
	PGr - Doctorate	0%	6%	0%	6%	3%		**4%**
	Other	0%	0%	0%	0%	1%		**1%**
Subject of studies								
	Architecture / Engineering / Technology	14%	59%	26%	38%	34%		**36%**
	Arts / Humanities	21%	18%	21%	12%	18%		**15%**
	Health Sciences / Medicine	0%	6%	5%	12%	14%		**11%**
	Mathematics / Physical Sciences	21%	12%	39%	11%	12%		**14%**
	Social Sciences	43%	6%	8%	27%	22%		**23%**

Overall, a good mix of students from different years and levels of education is found. The majority of respondents (70%) are undergraduates, while 25% of respondents are doing a masters degree. One percent of respondents selected the "other" option. These students are mainly exchange students (Erasmus or international), top-up students or research associates and study in the UK. Significant differences in the level of studies of the respondents are observed across individual countries ($\chi^2(20)=213.717$, $p<.001$). In Cyprus and Greece the majority of respondents (>75%) are at third year or higher of undergraduate studies. In Lithuania, almost all respondents (97%) are undergraduates. In the UK and Sweden a good mix between undergraduates and postgraduates is found.

Respondents study all main subjects of study, but subjects studied across countries vary significantly ($\chi^2(16)=43.214$, $p<.001$). Overall, the biggest percentage of respondents (36% of total) study architecture, engineering or technology and are assumed to have the best level of knowledge or awareness of energy saving issues. In Greece, the number of students studying architecture, engineering or technology is high (59%). In Cyprus this number is rather low (14% of respondents). In the remaining countries this percentage varies between 26% (Lithuania) and 38% (Sweden). The second most represented subject of study (23% of respondents) is social sciences. The least represented subjects of study are those of health sciences and medicine (11%).

4.2.2 Lifestyle

Respondents were asked to select the statement that best describes the way they will be living when they move out of dormitories, in relation to energy saving. Options were given on a 1 to 5 scale (1= A lot more, 5 = A lot less) including a "don't know" option.

A large shift towards a more energy efficient behavior is evident from Figure 2. Overall, the number of respondents selecting the "a lot more" option has increased by 9% compared to the baseline. A decrease in the selection of all other options is observed.

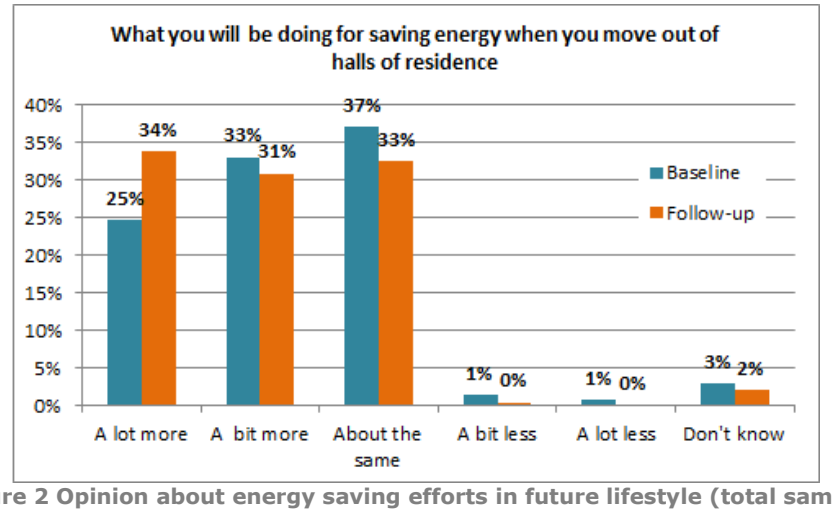

Figure 2 Opinion about energy saving efforts in future lifestyle (total sample)

As shown in Table 15 there is an increase, compared to the baseline, in the number of respondents selecting "a lot more" in all countries except for Lithuania. In Lithuania, the number of students selecting this option remains unchanged and the only change is a small positive shift of responses from the "a bit less" option to the "a bit more" option. The number of respondents selecting the options with a more negative meaning ("A bit less" or "A lot less") or the "don't know" option have either decreased or remained the same in all countries.

Table 15 Energy saving efforts in future lifestyle (per country)

How do you think you will be living when you move out of dormitories?												
	I think I'll be doing a lot more to save energy		I think I'll be doing a bit more to save energy		I think I'll probably be doing about the same to save energy		I think I'll be doing a bit less to save energy		I think I'll be doing a lot less to save energy		Don't Know	
	follow-up	% change	follow-up	% change	follow-up	% change	follow-up	% change	follow-up	% change	follow-up	% change
Cyprus	29%	50%	21%	-14%	43%	-29%	0%	0%	7%	-7%	0%	0%
Greece	19%	19%	38%	-13%	44%	-6%	0%	0%	0%	0%	0%	0%
Lithuania	45%	0%	32%	3%	18%	0%	3%	-3%	0%	0%	3%	0%
Sweden	22%	4%	34%	-6%	39%	3%	1%	-1%	0%	0%	3%	0%
UK	24%	13%	33%	4%	38%	-14%	1%	0%	1%	-1%	3%	-2%

4.2.3 (Perceived) level of information

Respondents were asked to rate how well informed they feel about a) their own energy consumption and b) the possibilities to save energy in their dormitories on a 1 to 5 scale (1= Very badly informed, 5 = Very well informed).

What you personally consume in your dormitory?

Paired samples t-test was used to determine whether the differences between the baseline and follow-up survey are statistically significant. Results show that differences are marginally significant ($t(444)=1.851$, $p=.065$) and are towards a decrease in the level of information on what respondents personally consume in their dormitory (5% decrease in the mean value overall).

There are also significant differences in the level of knowledge across countries in both the baseline results ($\chi^2(16)=67.286$, $p<.001$) and the follow-up questionnaire results ($\chi^2(16)=76.711$, $p<.001$).

A decrease is observed in all countries except for Greece (Figure 3 and Table 16). Because students were asked to save energy, through SSO, they started to think about it more consciously and wanted to know how much they consume and how well they are performing whereas before SSO students probably didn't think about it as consciously. Therefore, the decrease in the level of information on what respondents personally consume in their dormitory is attributed to the fact that students only received basic energy consumption information. For Greece the increase in the level of information on what respondents personally consume in their dormitory is found in the Technical University of Greece where an energy management program has been implemented for the entire campus this year which provided detailed energy consumption feedback for the dorms as well.

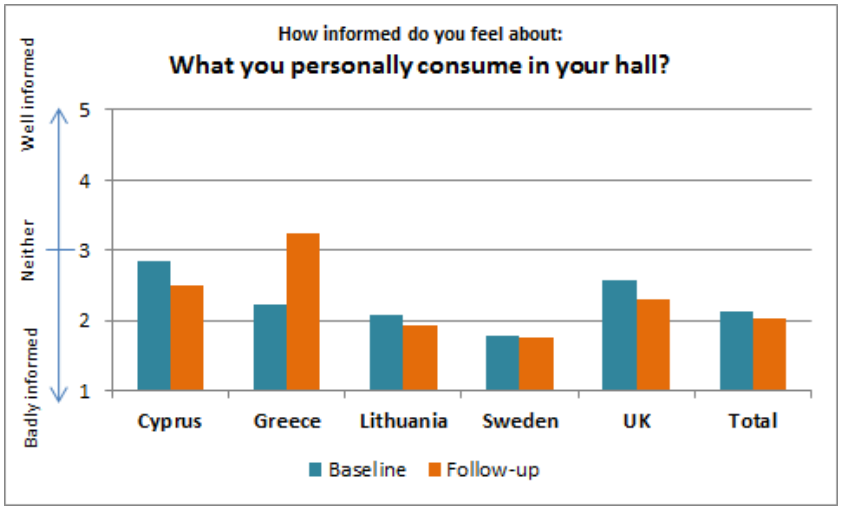

Figure 3 Mean values for perceived level of information on personal energy use (total sample and per country)

At the end of the academic year the highest level of knowledge on what respondents personally consume in their dormitory is found in Greece (3.24±1.48) and the lowest in Sweden (1.75±1.04). The biggest reduction in the level of information on what respondents personally consume in their dormitory is met in Cyprus (13% reduction). In the remaining countries this reduction ranges between 2% (Sweden) and 10% (UK).

Paired samples t-test show a marginally statistically significant increase in Greece (*t(16)=-2.062, p=.056*) and a statistically significant decrease in the UK (*t(154)=2.918, p<.001*).

Table 16 Mean values and standard deviations for perceived level of information on personal energy use (total sample and per country)

What you personally consume in your dormitory?						
	Baseline		Follow-up		Change in mean value	% change in mean value
	mean	SD	mean	SD		
Cyprus	2,86	1,10	2,50	1,22	-0,36	-13%
Greece	2,24	1,20	3,24	1,48	1,00*	45%
Lithuania	2,08	,91	1,92	1,00	-0,16	-8%
Sweden	1,79	1,03	1,75	1,04	-0,04	-2%
UK	2,57	1,17	2,30	1,20	**-0,26***	-10%
Total	2,13	1,14	2,04	1,17	-0,10	-5%

What you personally can do to save energy in your dormitory?

Paired samples t-test shows that differences between the baseline and follow-up results are statistically significant (*t(444)=-6.625, p<.001*). Difference is towards an increase in the level of knowledge of what respondents can do to save energy in their dormitory (increase of 13% in the mean value overall). Such an increase is observed in all individual countries (Figure 4 and Table 17).

Significant differences across countries in both the baseline results ($\chi^2(16)=75.436$, $p<.001$) and the follow-up questionnaire results ($\chi^2(16)=85.529$, $p<.001$) are also found.

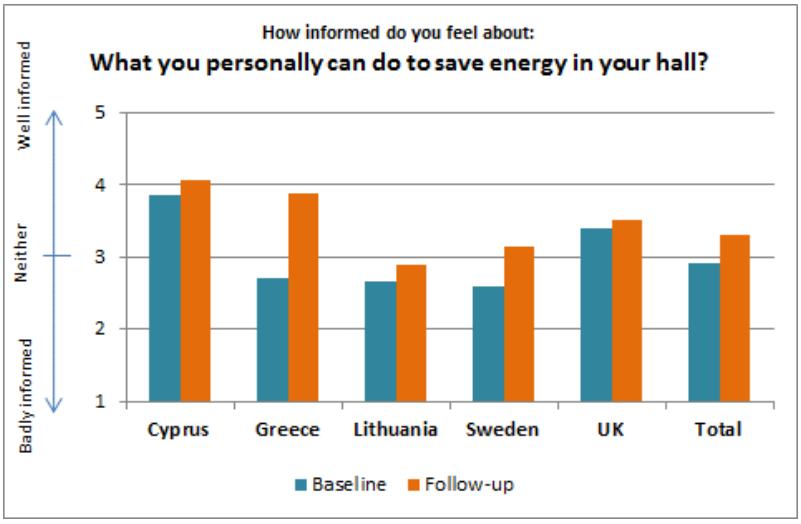

Figure 4 Mean values for perceived level of information on ways to save energy (total sample and per country)

At the end of the academic year the highest level of knowledge on what respondents can personally do to save energy in their dormitory is found in Cyprus (4.07±1.44) and the lowest in Lithuania (2.89±0.86). The biggest increase in the level of information on what respondents can personally do to save energy in their dormitory is found in Greece (43% increase). In the remaining countries this increase ranges between 3% (UK) and 21% (Sweden).

Paired samples t-test shows a statistically significant increase in the level of information in Greece (*t(16)=-3.636, p=.002*) and in Sweden (*t(220)=-6.598, p<.001*).

Table 17 Mean values and standard deviations for perceived level of information on ways to save energy (total sample and per country)

What you personally can do to save energy in your dormitory?						
	Baseline		Follow-up		Change in mean value	% change in mean value
	mean	SD	mean	SD		
Cyprus	3,86	1,03	4,07	1,44	0,21	6%
Greece	2,71	1,21	3,88	,78	**1,18***	43%
Lithuania	2,66	,88	2,89	,86	0,24	9%
Sweden	2,60	1,15	3,14	1,13	**0,55***	21%
UK	3,39	1,08	3,50	1,00	0,11	3%
Total	2,92	1,17	3,31	1,09	0,38	13%

4.2.4 Energy awareness

4.2.4.1 Increase in energy awareness

Respondents were asked to rate how much their awareness on what they can do to reduce the impact of their lifestyle and habits on energy consumption has increased on a 1 to 5 scale (1= A great deal, 5 = Not at all).

Overall, the energy awareness of respondents has increased by "a little" (3.20±1.20). Differences across countries are not that significant ($\chi^2(16)=23.912$, p=.091)

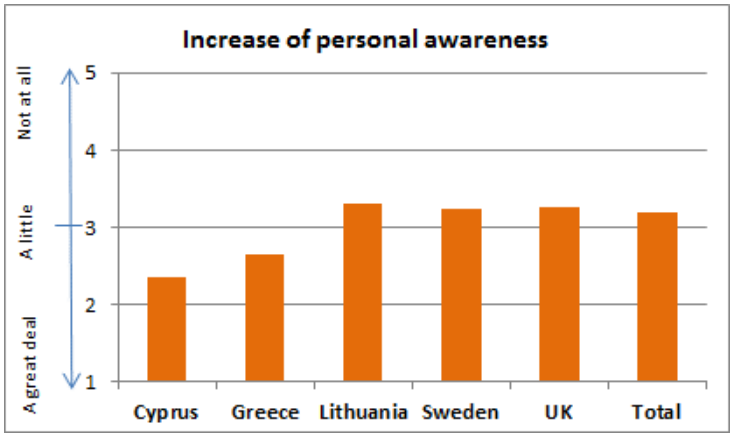

Figure 5 Mean values for increase in awareness of impacts (total sample and per country)

The biggest increase in energy awareness is reported from Cyprus and Greece (mean values <3). In Lithuania, Sweden and the UK mean values vary between 3.23 and 3.32.

Table 18 Mean values and standard deviations for increase in awareness of impacts (total sample and per country)

Increase of energy awareness											
Cyprus		**Greece**		**Lithuania**		**Sweden**		**UK**		**Total**	
mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
2,36	,93	2,65	1,27	3,32	1,02	3,23	1,22	3,26	1,20	3,20	1,20

4.2.4.1 Influential sources of information

Respondents were given a list of sources of information and were asked to select those that may have helped increase their energy awareness.

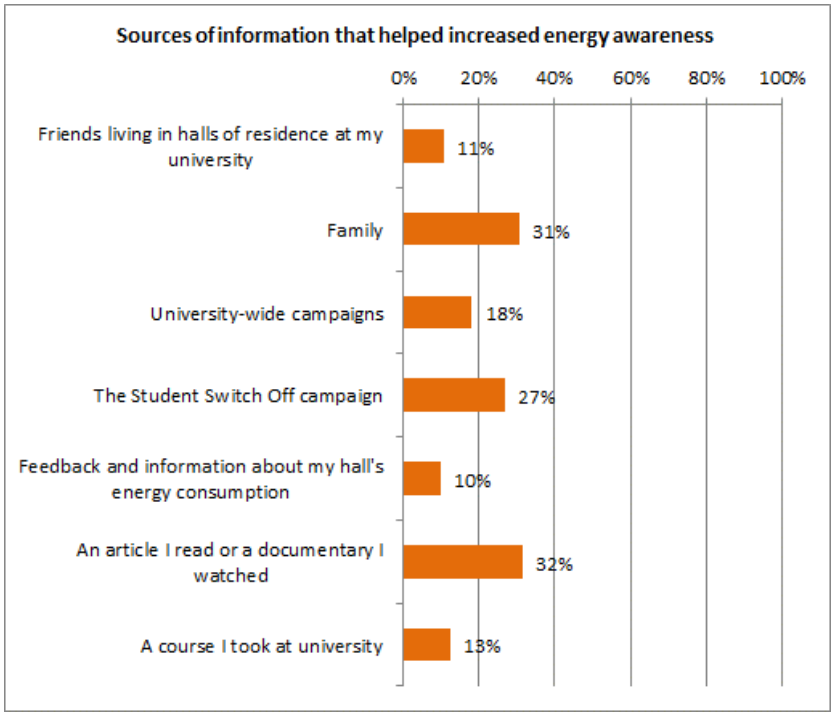

Figure 6 Main sources of information that have contributed to the increase of energy awareness (total sample)

As shown in Figure 6 the top three sources of information that helped the most in increasing the energy awareness of respondents are: family (32% of respondents); an article they have read or a documentary they watched (31% of respondents) and; the Student Switch Off campaign (27% of respondents). The least influential sources of information are: feedback and information on their dormitory's energy consumption (10%); friends living in dormitory (12%) and; university courses (13%).

Student Switch Off receives a high number of votes and is in the top three most influential sources of information in all countries except for Sweden.

Table 19 Main sources of information that have contributed to the increase of energy awareness (total sample and per country)

Sources of information	Cyprus	Greece	Lithuania	Sweden	UK	Total
Friends living in dormitories at my university	36%	6%	11%	9%	12%	11%
Family	50%	24%	34%	26%	35%	31%
University-wide campaigns	29%	12%	16%	13%	26%	18%
The Student Switch Off campaign	71%	47%	39%	12%	39%	27%
Feedback and information about my dormitory's energy consumption	29%	35%	13%	5%	11%	10%
An article I read or a documentary I watched	43%	47%	29%	37%	21%	32%
A course I took at university	29%	24%	11%	15%	6%	13%

4.2.5 Habits and practices

Respondents were asked to give the frequency in which they perform each of the six targeted energy saving behaviours on a 1 to 5 scale (1= Never, 5 = Always).

Only the respondents that answered "yes" to question 11 (see Appendix A) on whether they have heard about the Student Switch Off campaign were considered for this question.

An increase, is observed at the end of the academic year, in the frequency that all targeted behaviours are performed compared to the beginning of the academic year. In the case of more well known energy saving habits like switching off lights in empty rooms, putting an extra layer on before using heating and opening windows for cooling, this increase is very small. In the case of less known energy saving habits like avoiding leaving electronic equipment on stand-by ($t(229)=-1.821,\ p=.070$), putting a lid on pans when cooking ($t(229)=-1.731,\ p=.085$), and boiling only the right amount of water ($t(229)=-1.981,\ p=.049$) this increase is somewhat statistically significant and in the range of 3-4% (Table 20).

The behaviors performed more frequently and can be considered more of a habit given the high frequency of performance are those of switching off lights in empty rooms and opening windows for cooling (mean values of 4.51±0.63 and 4.60±0.80, respectively).

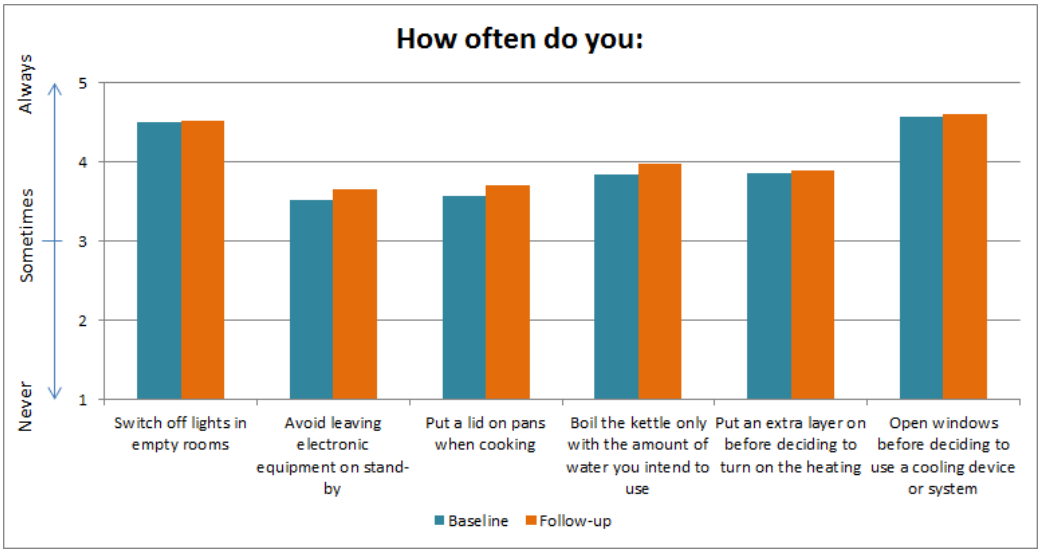

Figure 7 Mean values for frequency in which energy saving actions are performed (total sample)

Paired samples t-test was performed for each country[8] to determine the behaviours that have changed the most since the beginning of the academic year.

In Cyprus a significant increase is observed in the frequency that lights are switched off in empty rooms (*t(13)=-2.280, p<.05*).

In Greece a significant increase is observed in the frequency that a lid is put on pans when cooking (*t(12)=-2.889, p<.05*).

In Sweden a significant increase is observed in the frequency that a lid is put on pans when cooking (*t(85)=-2.184, p<.05*). A somewhat significant change is also found in the frequency that the right amount is boiled with the kettle (*t(85)=-1.787, p=.077*) and that extra layers are put on instead of the heating (*t(85)=-1.805, p=.075*).

The action performed the most often in Cyprus and Greece is that of switching off lights in empty rooms (4.93±0.27 and 4.74±0.44, respectively). In Lithuania, Sweden and the UK the action performed most often is that of opening windows for cooling (4.95±0.22, 4.63±0.80 and 4.64±0.78, respectively).

The least performed action in Cyprus and the UK is that of putting a lid in pans when cooking (3.79±0.89 and 3.38±1.28, respectively). In Greece the action performed least often is that of putting an extra layer on instead of the heating system (3.62±0.96). In Lithuania and in Sweden the action performed the least often is that of avoiding leaving electronic equipment on stand-by (3.35±1.04 and 3.51±1.09, respectively). Still all action are performed more often than "sometimes" (3=sometimes).

Table 20 Mean values and standard deviations for the frequency in which energy saving actions are performed (per country)

	Baseline		Follow-up		Change in mean value	% Change in mean value
	mean	SD	mean	SD		
Switch off lights in empty rooms						
Cyprus	4,64	,50	4,93	,27	0,3	***6%**
Greece	4,62	,51	4,77	,44	0,2	3%
Lithuania	-	-	4,60	,60	-	-
Sweden	4,49	,68	4,44	,61	0,0	-1%
UK	4,48	,64	4,48	,68	0,0	0%
Total	4,50	,64	4,51	,63	0,0	0%

[8] Note: This question was accidentally deleted from the Lithuanian version of the baseline survey therefore no responses are available for the baseline.

	Baseline		Follow-up		Change in mean value	% Change in mean value
	mean	SD	mean	SD		
Avoid leaving electronic equipment on stand-by						
Cyprus	4,00	,96	4,43	,76	0,4	11%
Greece	3,92	,76	3,92	,86	0,0	0%
Lithuania	-	-	3,35	1,04	-	-
Sweden	3,36	1,12	3,51	1,09	0,2	4%
UK	3,52	1,06	3,62	1,12	0,1	3%
Total	3,51	1,07	3,64	1,10	0,1	*4%
	Baseline		**Follow-up**		**Change in mean value**	**% Change in mean value**
	mean	**SD**	**mean**	**SD**		
Put a lid on pans when cooking						
Cyprus	3,86	1,03	3,79	,89	-0,1	-2%
Greece	3,38	1,04	4,00	1,00	0,6	***18%**
Lithuania	-	-	4,10	,72	-	-
Sweden	3,85	1,08	4,07	,84	0,2	***6%**
UK	3,36	1,18	3,38	1,28	0,0	1%
Total	3,57	1,15	3,70	1,14	0,1	*3%
	Baseline		**Follow-up**		**Change in mean value**	**% Change in mean value**
	mean	**SD**	**mean**	**SD**		
Boil the kettle only with the amount of water you intend to use						
Cyprus	4,00	1,11	4,07	,92	0,1	2%
Greece	4,00	1,00	4,31	,75	0,3	8%
Lithuania	-	-	3,80	,89	-	-
Sweden	3,94	1,01	4,15	,80	0,2	*5%
UK	3,71	1,10	3,79	1,16	0,1	2%
Total	3,83	1,06	3,97	1,01	0,1	***4%**
	Baseline		**Follow-up**		**Change in mean value**	**% Change in mean value**
	mean	**SD**	**mean**	**SD**		
Put an extra layer on before deciding to turn on the heating						
Cyprus	4,00	,96	3,93	,92	-0,1	-2%
Greece	3,69	1,03	3,62	,96	-0,1	-2%
Lithuania	-	-	4,05	1,15	-	-
Sweden	3,67	1,25	3,91	1,13	0,2	*6%
UK	4,00	1,07	3,91	1,24	-0,1	-2%
Total	3,86	1,14	3,89	1,16	0,0	1%
	Baseline		**Follow-up**		**Change in mean value**	**% Change in mean value**
	mean	**SD**	**mean**	**SD**		
Open windows before deciding to use a cooling device or system						
Cyprus	4,00	,78	4,36	,74	0,4	9%
Greece	4,31	,48	4,31	1,03	0,0	0%
Lithuania	-	-	4,95	,22	-	-
Sweden	4,67	,69	4,63	,80	0,0	-1%
UK	4,59	,65	4,64	,78	0,1	1%
Total	4,57	,68	4,60	,80	0,0	1%

*: statistically significant change (p<.05)

4.2.6 Behavioural antecedents

Overall, thirteen items from nine variables of behaviour change theory and models were measured with the survey. Items were evaluated on a five-point Likert Scale (1= Strongly disagree, 5 = Strongly Agree) with higher values indicating a higher level of agreement with the statement.

Only the respondents that answered "yes" to question 11 (see Appendix A) on whether they have heard about the Student Switch Off campaign were considered for this question.

Between the baseline and follow-up survey differences are found in the mean values. Differences can be observed in Figure 8 and in Table 21.

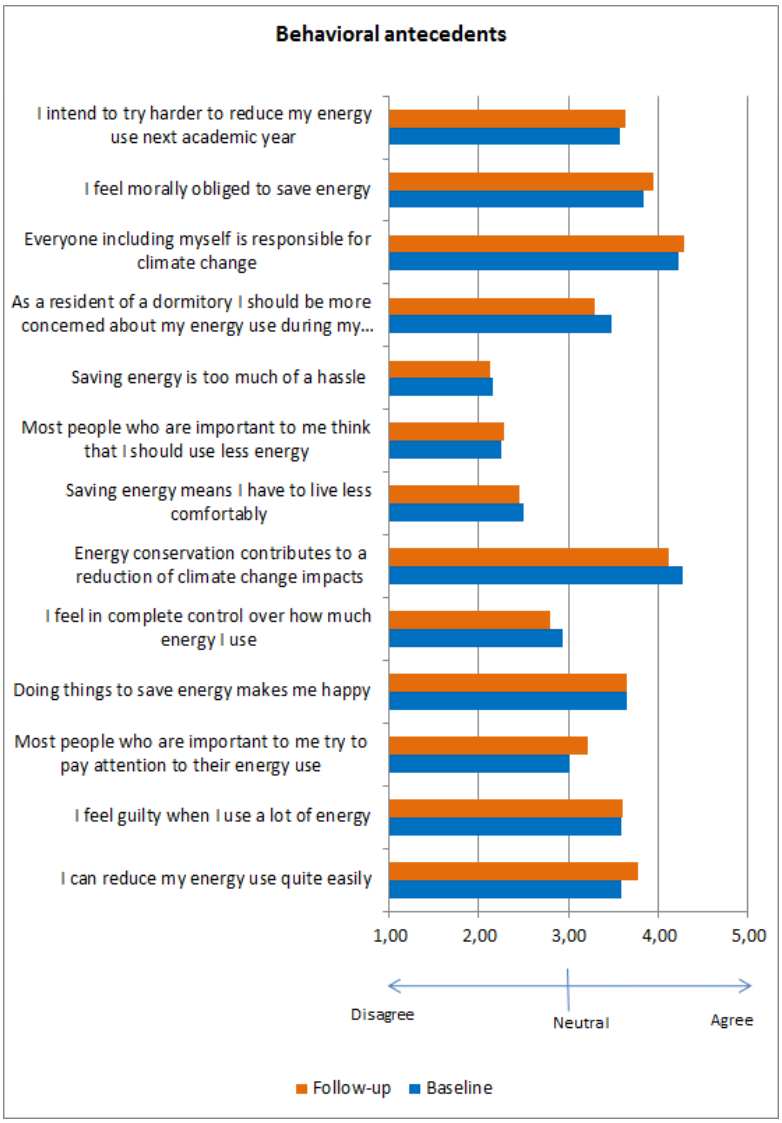

Figure 8 Mean values for behavioural antecedents (total sample)

Paired samples t-test was used to determine whether the differences between the baseline and follow-up survey are statistically significant.

Statistically significant changes are observed for five out of thirteen studied items. Changes are observed in at least one item from each of the three investigated behaviour change theory and models (Appendix C) but no single theory or model is verified with change in all its relevant variables. Insight as to why positive or negative changes have been made to these items is drawn from the analysis of other questions of the survey.

At the end of the academic year, respondents find it easier to reduce their energy use (perceived behavioural control, $t(249)=-3.171,\ p<.05$). This could be attributed to the increase in their energy awareness and to the level of knowledge of what they can do to save energy in their dorms. Also, respondents think more that most people who are important to them try to pay attention to their energy

use (subjective norm, *t(249)=-3.071, p<.05*). A reason for this could be the fact that friends of the respondents living in the dorms are doing more to save energy as part of the campaign or because due to the increase of their energy awareness they are now more observant of family and friends acting in an energy efficient way.
On the other hand, respondents feel less in control of how much energy they use (perceived behavioural control*, t(249)=1.929, p=.055*). This could be attributed to the lack of energy consumption information but also to barriers such as structural or system limitations of the dorms. Also, respondents think less that energy conservation contributes to a reduction in climate change impacts (awareness of consequences, *t(249)=2.687, p<.05*). Nonetheless, the mean value indicates high awareness of consequences in both the baseline and the follow-up survey. Finally, at the end of the academic year, respondents think less that as residents of a dormitory they should be more concerned about their energy use there (role beliefs, *t(249)=2.584, p<.05*). This may be because they feel they are already doing a lot to save energy or because they think that everyone including dormitory managers should be doing more to save energy in their dormitories.

Table 21 Mean values and standard deviations for personal norms items (total sample)

		Baseline		Follow-up		change
Personal norms		**M**	**SD**	**M**	**SD**	
PN-1	I feel morally obliged to save energy	3,84	,926	3,94	,885	0,10
PN-2	I feel guilty when I use a lot of energy	3,58	1,058	3,60	1,101	0,02
Acription of responsibility		**M**	**SD**	**M**	**SD**	**change**
AR-2	Everyone including myself is responsible for climate change	4,22	,952	4,29	,895	0,06
Awareness of consequences		**M**	**SD**	**M**	**SD**	**change**
AC-1	Energy conservation contributes to a reduction of climate change impacts	4,26	,884	4,12	,787	**-0,14***
Attitude		**M**	**SD**	**M**	**SD**	**change**
ATT-1	Saving energy is too much of a hassle	2,15	,851	2,13	,946	-0,02
ATT-2	Saving energy means I have to live less comfortably	2,49	,919	2,45	,998	-0,04
Perceived behavioral control		**M**	**SD**	**M**	**SD**	**change**
PBC-1	I can reduce my energy use quite easily	3,59	,842	3,77	,807	**0,18***
PBC-2	I feel in complete control over how much energy I use	2,94	1,020	2,80	1,037	-0,14*
Subjective norm		**M**	**SD**	**M**	**SD**	**change**
SN-1	Most people who are important to me think that I should use less energy	2,25	,934	2,28	,967	0,03
SN-2	Most people who are important to me try to pay attention to their energy use	3,01	,901	3,21	,955	**0,20***
Emotions		**M**	**SD**	**M**	**SD**	**change**
EMO-1	Doing things to save energy makes me happy	3,66	,798	3,66	,865	0,00
Role beliefs		**M**	**SD**	**M**	**SD**	**change**
ROL-1	As a resident of a dormitory I should be more concerned about my energy use during my stay there	3,48	,958	3,29	,997	**-0,19***
Intention		**M**	**SD**	**M**	**SD**	**change**
INT-1	I intend to try harder to reduce my energy use this academic year	3,58	,942	3,64	,891	0,06

*****: statistically significant change

Personal norms

Personal norms were measured with two items. A marginally significant change is observed in Sweden in the first item (*t(85)=-1.826, p=.071*). The increase in the mean value at the end of the academic year is indicative of an increase in the feeling of moral obligation to save energy.

Table 22 Mean values and standard deviations for personal norms items (per country)

	Baseline		Follow-up		Change in mean value
	M	**SD**	**M**	**SD**	
I feel morally obliged to save energy					
Cyprus	4,07	1,207	4,36	,745	0,29
Greece	4,08	,494	4,31	,480	0,23
Lithuania	3,50	,946	3,30	,923	-0,20
Sweden	3,93	,905	4,13	,809	0,20*
UK	3,78	,930	3,83	,912	0,05
I feel guilty when I use a lot of energy					
Cyprus	3,57	1,222	3,50	1,160	-0,07
Greece	3,38	,961	3,31	1,109	-0,08
Lithuania	3,35	,875	3,00	,649	-0,35
Sweden	3,63	1,030	3,69	1,055	0,06
UK	3,61	1,106	3,68	1,164	0,08

*****: statistically significant change

Ascription of responsibility

Ascription of responsibility was measured with one item. A statistically significant change is observed in Lithuania (*t(19)=2.666, p<.05*). The decrease in the mean value at the end of the academic year shows a decrease in ascription of responsibility.

Table 23 Mean values and standard deviations for ascription of responsibility item (per country)

Everyone including myself is responsible for climate change					
	Baseline		**Follow-up**		**Change in mean value**
	M	**SD**	**M**	**SD**	
Cyprus	4,14	1,099	4,43	,646	0,29
Greece	3,77	1,166	3,85	1,405	0,08
Lithuania	4,40	,681	4,05	,759	**-0,35***
Sweden	4,29	,906	4,42	,901	0,13
UK	4,21	,979	4,26	,855	0,06

*****: statistically significant change

Awareness of consequences

Awareness of consequences was measured with one item. Statistically significant change is observed in the UK (*t(116)=2.890, p<.05*). Respondents appear less aware of consequences at the end of the academic year with this change. Nonetheless, the mean values indicate high awareness of consequences in both the baseline and the follow-up survey.

Table 24 Mean values and standard deviations for awareness of consequences item (per country)

Energy conservation contributes to a reduction of the climate change impacts			
	Baseline	**Follow-up**	**Change in**

	M	SD	M	SD	mean value
Cyprus	4,29	,726	4,57	,646	0,29
Greece	4,31	1,316	4,31	1,182	0,00
Lithuania	3,95	,887	3,80	,834	-0,15
Sweden	4,36	,867	4,23	,714	-0,13
UK	4,24	,858	4,02	,765	**-0,22***

*: statistically significant change

Attitudes

Attitudes were measured through two items. No statistically significant change is observed in any of the two items.

Table 25 Mean values and standard deviations for attitudes items (per country)

	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Saving energy is too much of a hassle					
Cyprus	1,57	,852	1,36	,633	-0,21
Greece	1,77	,725	1,85	1,068	0,08
Lithuania	1,95	,759	2,05	,759	0,10
Sweden	2,28	,890	2,15	,927	-0,13
UK	2,21	,815	2,26	,966	0,05
Saving energy means I have to live less comfortably					
Cyprus	2,21	,893	2,14	1,027	-0,07
Greece	2,31	,855	2,38	,961	0,08
Lithuania	2,60	,821	2,20	1,005	-0,40
Sweden	2,59	,938	2,66	1,047	0,07
UK	2,45	,933	2,38	,945	-0,07

*: statistically significant change

Perceived behavioural control

Perceived behavioural control was measured through two items: an item measuring self-efficacy (PBC-1) and an item measuring controllability (PBC-2).

In Sweden and Greece statistically significant change is observed in the first item (*t(85)=-2.104, p<.05 and t(12)=-2.521, p<.05, respectively*). This change indicates an increase in the perception of how easily personal energy use can be reduced. Statistically significant change is observed in the UK in the second item (*t(116)=2.540, p<.05*) indicating a decrease in the perception of control over personal energy use.

Table 26 Mean values and standard deviations for perceived behavioural control items (per country)

	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
I can reduce my energy use quite easily					
Cyprus	4,07	,829	4,43	,514	0,36
Greece	3,31	,855	3,77	,927	**0,46***
Lithuania	3,80	,768	3,80	,616	0,00
Sweden	3,43	,914	3,66	,791	**0,23***
UK	3,64	,771	3,77	,834	0,13
I feel in complete control over how much energy I use					
Cyprus	3,57	,938	3,43	1,016	-0,14

Greece	2,92	,641	3,23	1,013	0,31
Lithuania	2,70	,801	2,85	1,089	0,15
Sweden	2,71	1,094	2,60	,986	-0,10
UK	3,07	,998	2,81	1,042	**-0,26***

*: statistically significant change

Subjective norms

Subjective norms were measured through two items: an injunctive item (SN-1) and a descriptive item (SN-2).

Statistically significant change is observed in Sweden and in the UK for the descriptive item (*t(85)=-2.417, p<.05 and t(116)=-2.179, p<.05, respectively*). This change shows an increase in the level that respondents think that the people who are important to them pay attention to their energy use.

Table 27 Mean values and standard deviations for subjective norms items (per country)

	Baseline		Follow-up		Change in mean value
	M	**SD**	**M**	**SD**	
Most people who are important to me think that I should use less energy					
Cyprus	2,43	,938	2,36	1,082	-0,07
Greece	2,00	,913	2,15	1,345	0,15
Lithuania	1,90	,641	2,05	,887	0,15
Sweden	2,10	,983	2,29	,944	0,19
UK	2,43	,913	2,32	,945	-0,10
Most people who are important to me try to pay attention to their energy use					
Cyprus	3,29	,726	3,14	,949	-0,14
Greece	2,69	1,182	3,08	1,115	0,38
Lithuania	2,35	,813	2,30	,923	-0,05
Sweden	3,13	,865	3,42	,901	**0,29***
UK	3,03	,880	3,23	,904	**0,20***

*: statistically significant change

Emotions

Emotions were measured with one item. No statistically significant change is observed in any country.

Table 28 Mean values and standard deviations for emotion item (per country)

Doing things to save energy makes me happy					
	Baseline		**Follow-up**		**Change in mean value**
	M	**SD**	**M**	**SD**	
Cyprus	4,07	,616	4,29	,726	0,21
Greece	3,85	,689	4,00	,816	0,15
Lithuania	3,50	,513	3,35	,745	-0,15
Sweden	3,66	,889	3,71	,810	0,05
UK	3,61	,787	3,56	,904	-0,05

*: statistically significant change

Role beliefs

Role beliefs were measured through one item. A statistically significant change is observed in Cyprus (*t(13)=2.463, p<.05*) and in the UK (*t(116)=2.388, p<.05*). In both countries there is a decrease in the

role belief that as residents of dormitories respondents should be more concerned about their energy use there.

Table 29 Mean values and standard deviations for role beliefs item (per country)

As a resident of a dormitory I should be more concerned about my energy use during my stay there					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Cyprus	4,50	,650	4,00	,555	**-0,50***
Greece	3,62	,961	3,46	1,266	-0,15
Lithuania	3,40	1,273	3,15	,875	-0,25
Sweden	3,33	,951	3,26	,984	-0,07
UK	3,47	,867	3,24	1,014	**-0,23***

*: statistically significant change

Intention

Finally, respondents were asked to indicate their intention to try harder to save energy over the next academic year through one item. A marginally significant change is observed in Lithuania (*t(19)=1.917, p=.070*), indicating a decrease in the intention to save energy in the coming academic year.

Table 30 Mean values and standard deviations intentions item (per country)

I intend to try harder to reduce my energy use this/next academic year					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Cyprus	4,21	,579	4,36	,497	0,14
Greece	3,38	1,044	3,54	1,127	0,15
Lithuania	3,40	,883	2,95	,686	-0,45*
Sweden	3,35	1,049	3,51	,891	0,16
UK	3,72	,839	3,77	,845	0,05

*: statistically significant change

4.2.7 Determinants of energy saving

4.2.7.1 Incentives

Respondents were asked to select the three most important reasons for being more energy conscious from a list provided to them.

As observed from Figure 9 the three most important drivers of energy consciousness are the fact that it is an adopted habit from home, it saves energy, and it's the right thing to do. The fact that it reduces global warming is also very high in the list. This reason was the third most important reason in the baseline period exceeding the option saying that it's the right thing to do in number of votes. Others asking them to save energy, earning prizes out of it, gaining approval of other people and fitting in with other energy conscious residents of the dormitory seem to have minimal impact on respondents' energy consciousness.

Compared to the baseline period there is a significant increase (8% more respondents) in those saying that energy saving is a habit they adopted from home and a significant reduction (7% less respondents) in those saying that they are more energy conscious because it helps reduce global warming.

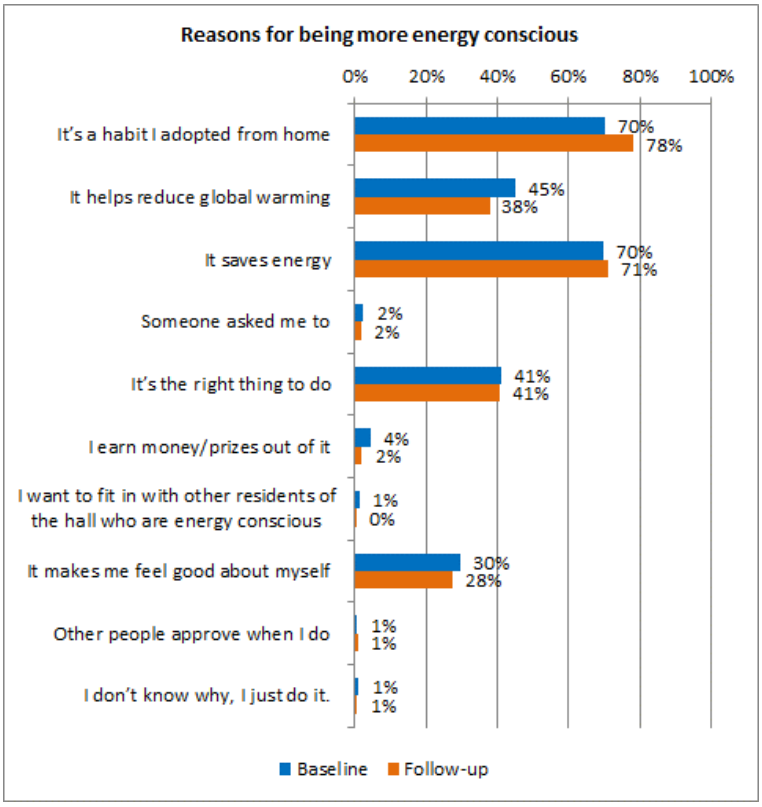

Figure 9 Reasons for being more energy conscious (total sample)

In all countries "it's a habit I adopted from home" and "it saves energy" remain in the top three reasons in all countries. In Cyprus, Greece and Lithuania the third reason in the top three list is "it makes me feel good about myself" while is Sweden the third reason is "it helps reduce global warming".
Between the baseline and follow-up survey there is no change in the items in the top three list for any country.

In Cyprus and in Lithuania the biggest change between the baseline and follow-up questionnaires is in the fact that it helps reduce global warming (14% and 16% reduction, respectively). In Greece there is 24% reduction in the proportion of respondents that say that it saves more energy. In Sweden and in the UK an increase (8% and 9%, respectively) is observed in those saying that it's a habit adopted from home.

Others asking them to save energy, earning prizes out of it, gaining approval of other people and fitting in with other energy conscious residents of the dormitory seem to have minimal impact on respondents' energy consciousness in all individual countries. These reasons had the minimum impact during the baseline period in all individual countries as well.

Table 31 Reasons for being more energy conscious (per country)

Reason for being more energy conscious		**Cyprus**	**Greece**	**Lithuania**	**Sweden**	**UK**	**Total**
It's a habit I adopted from home	**follow-up**	79%	59%	76%	80%	79%	78%
	% change	7%	0%	8%	8%	9%	8%
It helps reduce global warming	**follow-up**	43%	47%	18%	41%	36%	38%
	% change	-14%	0%	-16%	-5%	-8%	-7%
It saves energy	**follow-up**	79%	88%	71%	71%	69%	71%
	% change	7%	24%	-3%	-2%	4%	1%
Someone asked me to	**follow-up**	0%	0%	0%	1%	3%	2%
	% change	0%	0%	-3%	-1%	1%	-1%

It's the right thing to do	**follow-up**	29%	18%	45%	41%	43%	41%
	% change	7%	12%	8%	2%	-8%	0%
I earn money/prizes out of it	**follow-up**	7%	0%	0%	2%	3%	2%
	% change	7%	-6%	-3%	-4%	-1%	-2%
I want to fit in with other residents of the dormitory who are energy conscious	**follow-up**	0%	0%	0%	0%	1%	0%
	% change	0%	-6%	-5%	-1%	0%	-1%
It makes me feel good about myself	**follow-up**	57%	76%	53%	25%	17%	28%
	% change	0%	6%	13%	-2%	-7%	-2%
Other people approve when I do	**follow-up**	0%	0%	0%	0%	2%	1%
	% change	0%	0%	-3%	0%	1%	0%
I don't know why, I just do it.	**follow-up**	0%	0%	0%	1%	1%	1%
	% change	0%	0%	0%	-1%	0%	0%

4.2.7.2 Barriers

Respondents were asked to select the three most important reasons for being less energy conscious from a list provided to them.

As observed from Figure 10 overall the three least important drivers of energy consciousness are the fact that there is no energy consumption feedback, no money is being saved from energy saving and limitations of the building structure and its systems. These three reasons are the most popular in the baseline period as well.

Overall, the attitude that sustainable living is not for them and fear that others will make fun of them does not seem to have a serious impact on respondents' energy consciousness. Differences between the baseline and follow-up period are between 0-2% for the majority of options (Figure 10). Only in the option "the energy I save in the dormitory won't save me any money" and "I don't know how" is the difference greater than 2% (5% and 4% reduction in the follow-up survey, respectively).

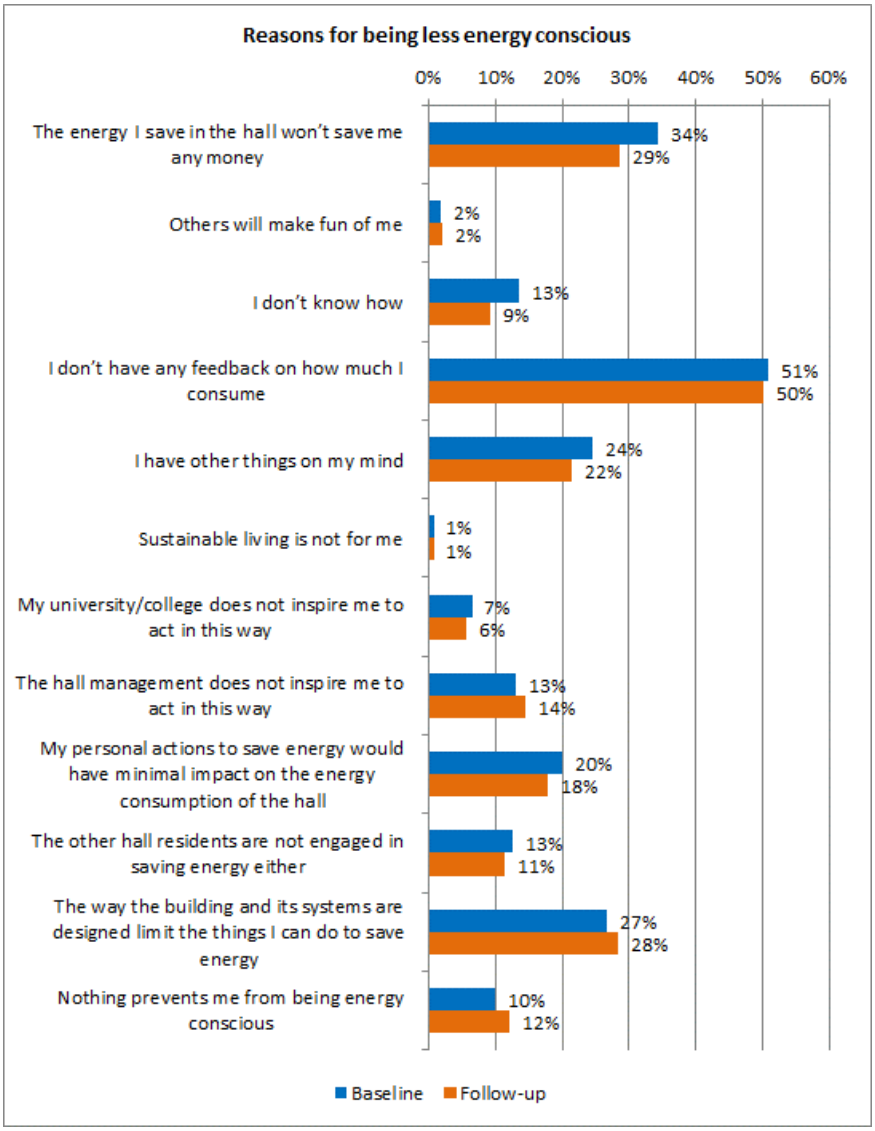

Figure 10 Reasons for being less energy conscious (total sample)

The top reasons for being less energy conscious vary between countries. Therefore, a common trend cannot be identified. Only the lack of energy consumption feedback has a common ranking in all countries and it is in fact the number one reason for being less energy conscious in all countries (ranging from 36% (Cyprus) to 52% (Sweden) of respondents across countries). Lack of energy consumption feedback remains high in the list of reasons because only basic energy consumption information was provided in year 1 of the campaign. In year 2 where more detailed energy consumption information will be provided to students the lack of energy consumption feedback is expected to become a less popular reason for being less energy conscious.

A difference in the ranking of top reasons is also found between the baseline and follow-up in individual countries. Only in Sweden the ranking of top reason remains unchanged between the baseline and follow-up survey. Lack of energy consumption feedback was not the top reason for being less energy conscious in Lithuania and Cyprus in the baseline survey.

In Cyprus the biggest change between the baseline and follow-up survey is in the lack of energy consumption feedback (21% increase of responses) and structural/system limitations of the building (21% increase of responses). In Greece a 67% decrease is observed in the number of respondents that say that saving energy in their dormitory won't save them any money. Another important observation for Greece is the increase of the number of respondents (12% increase) that think that others will make fun of them. In Lithuania there is a 75% increase in the number of respondents saying that the lack of energy consumption feedback is a reason for being less energy conscious. In Sweden a 22% decrease is observed in those that say that saving energy won't save them any money. In the UK there is a 34%

decrease in the number of respondents that say that they don't know how to save energy and to those saying that their personal actions to save energy will have minimal impact on energy.

Table 32 Reasons for being less energy conscious (per country)

Reason for being less energy conscious		Cyprus	Greece	Lithuania	Sweden	UK	Total
The energy I save in the dormitory won't save me any money	**follow-up**	14%	6%	42%	23%	37%	29%
	% change	7%	-67%	-63%	-22%	-6%	-21%
Others will make fun of me	**follow-up**	0%	12%	0%	1%	3%	2%
	% change	0%	33%	-13%	-1%	3%	1%
I don't know how	**follow-up**	14%	12%	0%	11%	8%	9%
	% change	0%	-17%	0%	-9%	-34%	-16%
I don't have any feedback on how much I consume	**follow-up**	36%	41%	50%	52%	50%	50%
	% change	21%	0%	75%	-20%	6%	-3%
I have other things on my mind	**follow-up**	7%	6%	11%	23%	26%	22%
	% change	-14%	-33%	-50%	1%	-17%	-11%
Sustainable living is not for me	**follow-up**	0%	0%	0%	1%	1%	1%
	% change	0%	0%	0%	1%	-3%	0%
My university/college does not inspire me to act in this way	**follow-up**	7%	6%	16%	3%	7%	6%
	% change	0%	-33%	-38%	-1%	6%	-3%
The dormitory management does not inspire me to act in this way	**follow-up**	0%	12%	45%	15%	7%	14%
	% change	0%	-33%	63%	-6%	20%	5%
My personal actions to save energy would have minimal impact on the energy consumption of the dormitory	**follow-up**	14%	29%	16%	15%	21%	18%
	% change	0%	0%	-63%	10%	-34%	-8%
The other dormitory residents are not engaged in saving energy either	**follow-up**	14%	6%	5%	10%	15%	11%
	% change	0%	17%	-38%	-9%	9%	-4%
The way the building and its systems are designed limit the things I can do to save energy	**follow-up**	29%	29%	26%	28%	28%	28%
	% change	21%	-6%	5%	-3%	6%	2%
Nothing prevents me from being energy conscious	**follow-up**	21%	18%	13%	14%	8%	12%
	% change	-14%	12%	5%	5%	-2%	2%

4.3 Results: Comparison with control group

In the first year of the competition a control group from Linkoping, Sweden was recruited. The treatment group is comprised of the Swedish dormitories (Stockholm and Gothenburg) participating in SAVES. One hundred and sixty seven valid responses for the follow-up survey were collected from occupants of the control group buildings and 222 from the treatment group buildings (Table 13Table 12). Propensity score matching was not used for the matching of the two groups because energy data are per building and not per student.

4.3.1 Respondent characteristics

The proportion of female respondents in the treatment group is higher (11% more female respondents) than the proportion of male respondents in the control group. In the control group, however, the number of female respondents is higher than male (1% more male respondents). Differences found in gender between countries are not statistically significant ($\chi^2(3)=5.045$, p=.169).

Significant differences are found in the age groups that participated in the survey between the two groups ($\chi^2(2)=18.002$, p<.001). The proportion of respondents from the treatment group that are 17-24 years of age is large (68% of respondents) but not as large as the proportion in the control group (86% of respondents). Almost one third of respondents from the treatment group are between 24-35 years of age while only 14% from the control group is in that age group.

Significant differences in the origin of students are also found between the two groups ($\chi^2(2)=22.910$, p<.001). The biggest majority (82%) of the respondents of the control group are native to the country they study and more than half (59%) of the respondents from the treatment group are native. Forty one percent of the treatment group respondents are not from Sweden. In the control group, the percentage of non-native respondents is 18%.

Table 33 Respondent demographics (follow-up survey)

		Treatment group	Control group
Gender			
	Male	42%	50%
	Female	53%	49%
	Other	1%	0%
	Prefer not to say	4%	2%
Age			
	<17 years	0%	0%
	17-24	68%	86%
	24-35	31%	14%
	>=35	1%	0%
Citizenship			
	Native	59%	82%
	EU citizen	23%	11%
	non-EU citizen	18%	7%
Year of study			
	1st Year University	16%	35%
	2nd Year University	20%	21%
	>2nd Year University	23%	24%
	PGr - Masters	33%	19%
	PGr - Doctorate	6%	0%
	Other	0%	1%
Subject of studies			
	Architecture /Engineering / Technology	38%	57%
	Arts / Humanities	12%	8%

Health Sciences / Medicine	12%	10%
Mathematics / Physical Sciences	11%	4%
Social Sciences	27%	22%

Significant differences are also found in the year of study of the respondents between the two groups ($\chi^2(5)=31.798$, $p<.001$). In the control group the proportion of first year students is more than double the proportion in the treatment group. In both groups a good mix of students from different years and levels of education is found. In the treatment group the proportion of postgraduate students is almost double the proportion in the control group.

Some differences are also found in the subject of study of the respondents between the two groups ($\chi^2(4)=16.740$, $p=.002$). The biggest percentage of respondents study architecture, engineering or technology in both groups but in the control group this proportion is much higher (57% for control group, 38% for treatment group). Smaller differences are found between the two groups for the remaining subjects of study; the biggest one is 7% more respondents in the treatment group studying health sciences or medicine.

4.3.2 Lifestyle

Respondents were asked to select the statement that best describes the way they will be living when they move out of the dormitories, in relation to energy saving. Options were given on a 1 to 5 scale (1= A lot more, 5 = A lot less) including a "don't know" option.

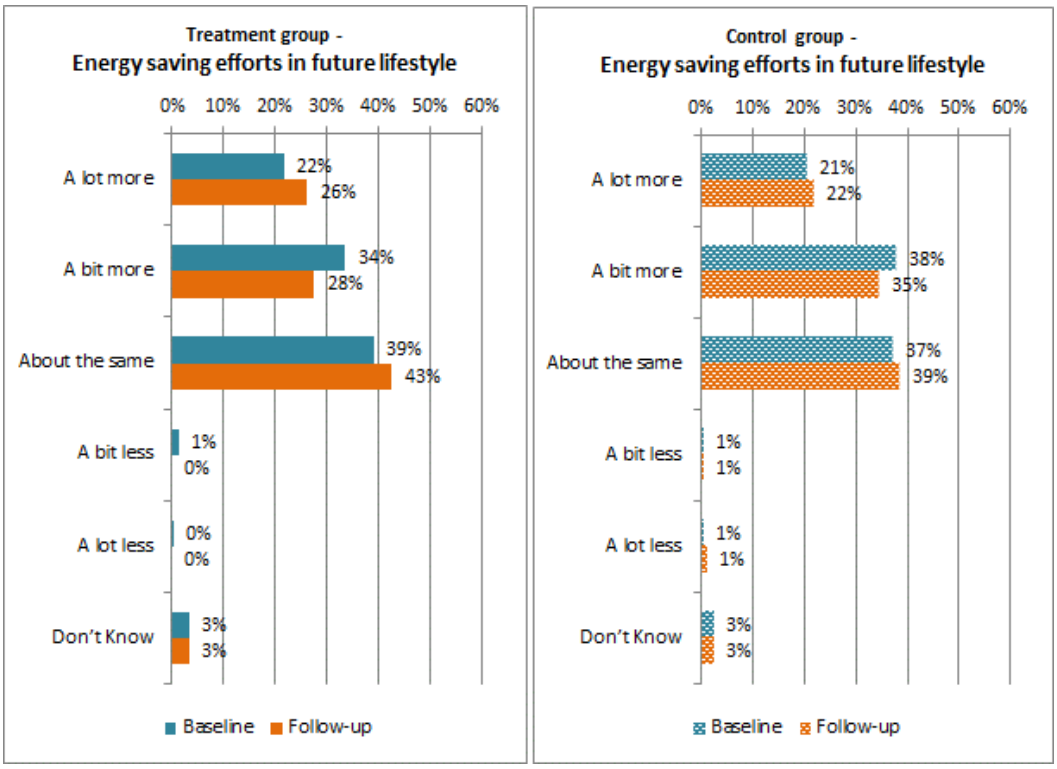

Figure 11 Opinion about energy saving efforts in future lifestyle (treatment and control group)

A positive shift towards a more energy efficient behavior in students' lives after they move out of dormitories is observed from Figure 11. This positive change is more profound for the treatment group. The number of respondents selecting "a lot more" shows a 4% increase compared to the baseline in the treatment group and only 1% in the control group. There is also an increase in the number of respondents answering "about the same" in both groups. The increase is again larger in the treatment group (4% in the treatment group, 2% in the control group). The increase in the two aforementioned options results from a reduction in the selection of the "a bit more" option in both groups and a 1% reduction in the "a bit less" option for the treatment group.

4.3.3 (Perceived) level of information

Respondents were asked to rate how well informed they feel about a) their own energy consumption and b) the possibilities to save energy in their dormitories on a 1 to 5 scale (1= Very badly informed, 5 = Very well informed).

Paired samples t-test was used to determine whether the differences between the baseline and follow-up survey are statistically significant.

What you personally consume in your dormitory?

Paired sampled t-test shows no statistically significant changes in any of the two groups in the perceived level of knowledge on what respondents personally consume in their dormitory (treatment, *t(220)=0.619, p=.537; c*ontrol, *t(162)=1.027, p=.306*).

A slight decrease is observed in both groups (Figure 12). This decrease is marginally larger in the control group.

The level of knowledge is at similar levels in the two groups and close to "badly informed". For the treatment group this is expected to improve in year 2 where additional energy consumption feedback will be provided to students.

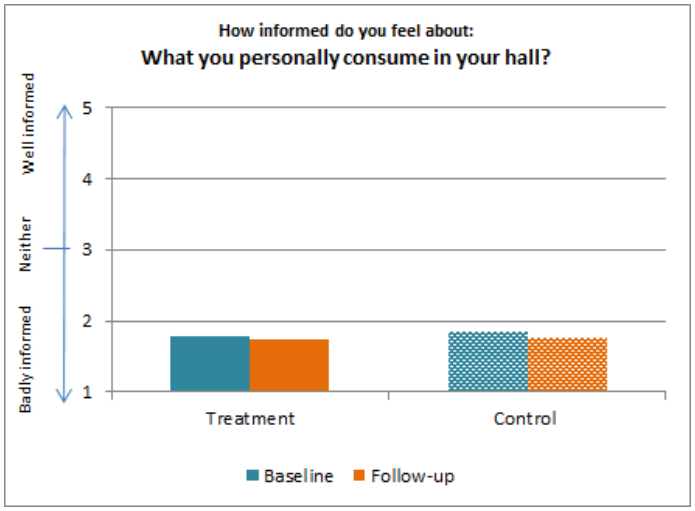

Figure 12 Mean values for perceived level of information on personal energy use (treatment and control group)

What you personally can do to save energy in your dormitory?

Paired sampled t-test shows statistically significant changes in both groups. However, changes are more significant in the treatment group (treatment group, *t(220)=-6.598, p<.001; c*ontrol group, *t(162)=-3.480, p=.001*).

There is an increase in the level of knowledge of what respondents can do to save energy in their dormitory in both groups. This increase is greater in the treatment group (treatment group, 0.55 increase in the mean value; control group, 0.36 increase in the mean value).

The level of knowledge is at similar levels in the two groups and close to "neither badly nor well informed".

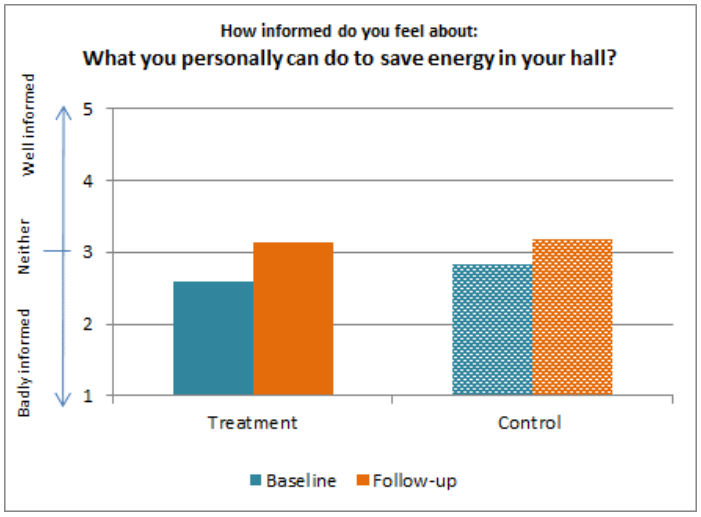

Figure 13 Mean values for perceived level of information on ways to save energy (treatment and control group)

4.3.4 Energy awareness

4.3.4.1 Increase in energy awareness

Respondents were asked to rate the increase in the level of awareness on what they can do to reduce the impact of their lifestyle and habits on energy consumption on a 1 to 5 scale (1= A great deal, 5 = Not at all).

Differences between the two groups are statistically significant ($\chi^2(4)=12.504$, p=.014). The increase in the energy awareness in the treatment group is higher in the treatment group.

Table 34 Mean values and standard deviations for increase in awareness of impacts (total sample and per country)

	Mean	SD
Treatment	3,2	1,2
Control	3,7	1,1

Respondents were given a list of sources of information and were asked to select those that may have made them more aware of what they can do to reduce their energy consumption.

The top three sources of information that helped increase energy awareness are common in both groups. Those are: an article/documentary; family, and; a university course.

The Student Switch Off campaign has influenced 12% of the respondents of the treatment and only 3% of the control group.

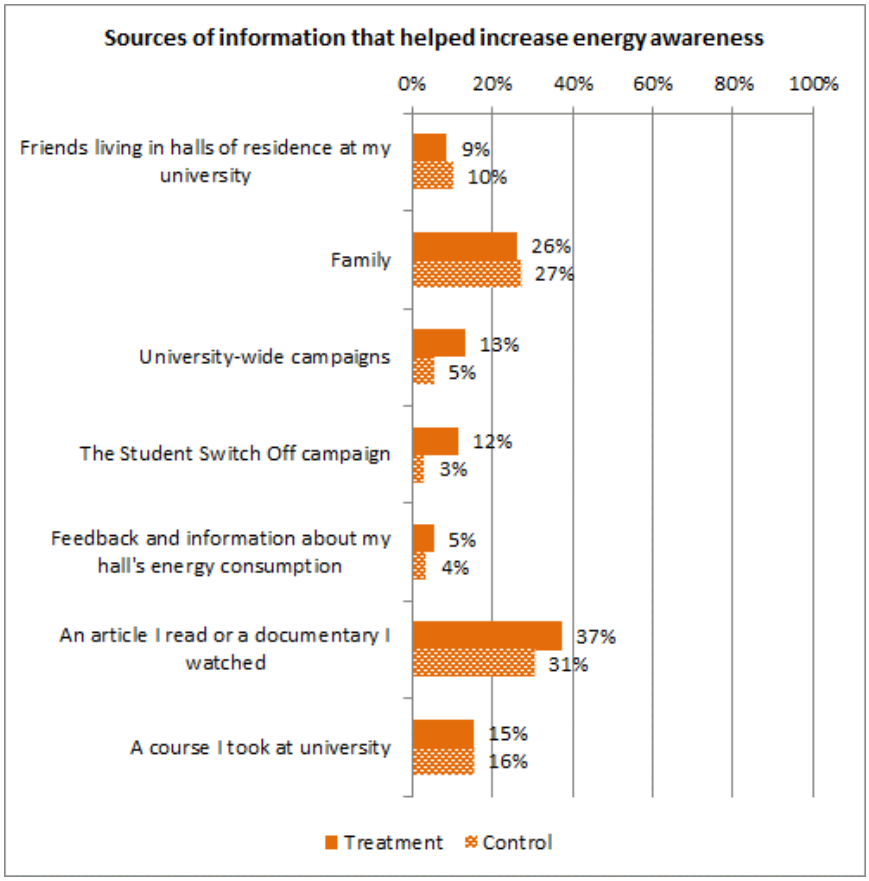

Figure 14 Main sources of information that have contributed to the increase of energy awareness (treatment and control group)

4.3.5 Habits and practices

Respondents were asked to give the frequency in which they perform each of the six targeted energy saving behaviours on a 1 to 5 scale (1= Never, 5 = Always).

For the case of the treatment group, only the respondents that answered "yes" to question 11 (see Appendix A) on whether they have heard about the Student Switch Off campaign were considered for this question.

Visual comparison of the mean values for the treatment and the control group (Figure 15) suggests similarities in the frequency that the targeted actions are performed in the two groups.

Paired samples t-test was used to determine whether the differences between the baseline and follow-up survey are statistically significant for each of the targeted energy saving behaviours.

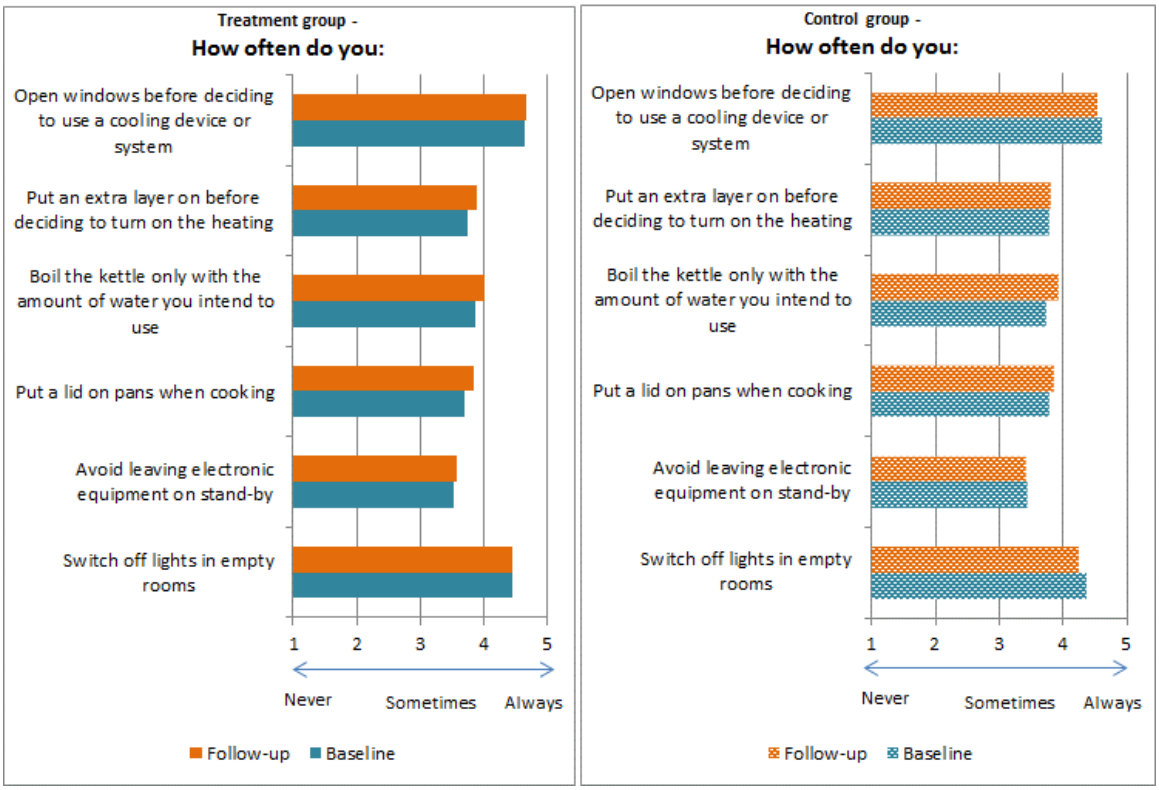

Figure 15 Mean values for frequency in which energy saving actions are performed (treatment and control group)

In the case of the treatment group an increase is observed in the frequency that four out of six targeted behaviours are performed. A marginal decrease is only observed in the case of switching off lights and opening windows for cooling. Change is statistically significant for the action of putting a lid on pans when cooking (*t(85)=-2.184, p<.05*) and somewhat significant for the action of boiling only the right amount of water (*t(85)=-1.787, p=.077*) and putting extra layers on instead of the heating (*t(85)=-1.805, p=.075*).

In the case of the control a decrease is observed in the frequency that three out of six targeted behaviours are performed. A statistically significant decrease occurred in the frequency that lights are switched off in empty rooms (*t(160)=2.034, p<.05*). A significant increase is observed only in the frequency that the right amount of water is boiled in the kettle (*t(160)=-2.191, p<.05*).

Table 35 Mean values and standard deviations for the frequency in which energy saving actions are performed (treatment and control group)

Action	Group	Baseline		Follow-up		Change in mean value	% Change in mean value
		M	SD	M	SD		
Switch off lights in empty rooms	**treatment**	4,49	,68	4,44	,61	-0,05	-1%
	control	4,35	,84	4,24	,81	**-0,12***	-3%
Avoid leaving electronic equipment on stand-by	**treatment**	3,36	1,12	3,51	1,09	0,15	4%
	control	3,44	1,19	3,42	1,06	-0,02	-1%
Put a lid on pans when cooking	**treatment**	3,85	1,08	4,07	,84	**0,22***	6%
	control	3,78	1,16	3,86	1,15	0,09	2%
Boil the kettle only with the amount of water you intend to use	**treatment**	3,94	1,01	4,15	,80	0,21*	5%
	control	3,75	1,14	3,94	1,05	**0,19***	5%
Put a jumper or an extra blanket before deciding to turn on the heating	**treatment**	3,67	1,25	3,91	1,13	0,23*	6%
	control	3,78	1,14	3,81	1,17	0,03	1%
Open windows to cool down before deciding to use a cooling device or system	**treatment**	4,67	,69	4,63	,80	-0,05	-1%
	control	4,60	,79	4,53	,87	-0,06	-1%

*: statistically significant change (p<.05)

4.3.6 Behavioural antecedents

Overall, thirteen items from nine variables of behaviour change theory and models were measured with the survey. Items were evaluated on a five-point Likert Scale (1= Strongly disagree, 5 = Strongly Agree) with higher values indicating a higher level of agreement with the statement.

From the treatment group, only the respondents that answered "yes" to question 11 (see Appendix A) on whether they have heard about the Student Switch Off campaign were considered for this question.

Figure 16 summarises the mean values for the baseline and follow-up survey for each measured item. Visual comparison of the two diagrams (treatment and control group) shows similarities in the mean values for all items. However, changes observed in the treatment group appear to be greater than the ones in the control group.

Paired samples t-test was used to determine whether the differences between the baseline and follow-up survey are statistically significant in the two groups.

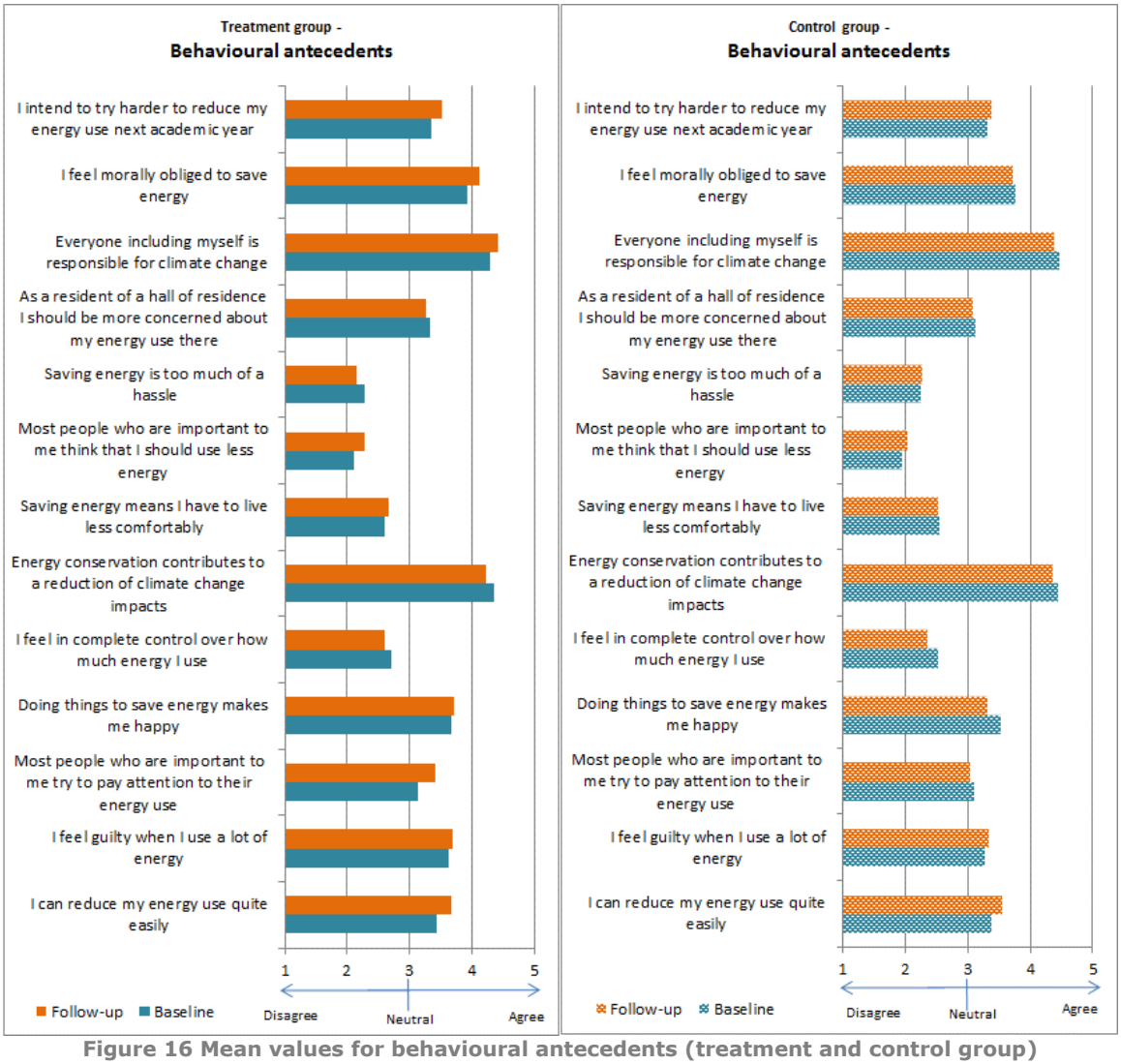

Figure 16 Mean values for behavioural antecedents (treatment and control group)

Personal norms

Personal norms were measured with two items. A marginally significant change is observed in the treatment group in the first item (*t(85)=-1.826, p=.071*). The increase in the mean value at the end of the academic year is indicative of an increase in the feeling of moral obligation to save energy.

Table 36 Mean values and standard deviations for personal norms items (treatment and control group)

	Baseline		Follow-up		Change in mean value
	M	**SD**	**M**	**SD**	
I feel morally obliged to save energy					
Treatment	3,93	,905	4,13	,809	0,20*
Control	3,77	1,004	3,72	1,108	-0,05
I feel guilty when I use a lot of energy					
Treatment	3,63	1,030	3,69	1,055	0,06
Control	3,28	1,160	3,35	1,132	0,08

*: statistically significant change

Ascription of responsibility

Ascription of responsibility was measured with one item. No statistically significant change is observed in any group.

Table 37 Mean values and standard deviations for ascription of responsibility item (treatment and control group)

Everyone including myself is responsible for climate change					
	Baseline		Follow-up		Change in mean value
	M	**SD**	**M**	**SD**	
Treatment	4,29	,906	4,42	,901	0,13
Control	4,47	,848	4,40	,872	-0,07

*: statistically significant change

Awareness of consequences

Awareness of consequences was measured with one item. No statistically significant change is observed in any group.

Table 38 Mean values and standard deviations for awareness of consequences item (treatment and control group)

Energy conservation contributes to a reduction of the climate change impacts					
	Baseline		Follow-up		Change in mean value
	M	**SD**	**M**	**SD**	
Treatment	4,36	,867	4,23	,714	-0,13
Control	4,46	,767	4,37	,747	-0,10

*: statistically significant change

Attitudes

Attitudes were measured through two items. No statistically significant change is observed in any group.

Table 39 Mean values and standard deviations for attitudes items (treatment and control group)

	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Saving energy is too much of a hassle					
Treatment	2,28	,890	2,15	,927	-0,13
Control	2,26	,961	2,28	,888	0,02
Saving energy means I have to live less comfortably					
Treatment	2,59	,938	2,66	1,047	0,07
Control	2,55	1,106	2,53	,982	-0,02

*: statistically significant change

Perceived behavioural control

Perceived behavioural control was measured through two items: an item measuring self-efficacy (PBC-1) and an item measuring controllability (PBC-2).

Statistically significant changes are observed in both groups in the first item (treatment group, *t(85)=-2.104, p<.05;* control group, *t(154)=-1.190, p<.05*). This change indicates an increase in the perception of how easily personal energy use can be reduced.

Table 40 Mean values and standard deviations for perceived behavioural control items (treatment and control group)

	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
I can reduce my energy use quite easily					
Treatment	3,43	,914	3,66	,791	**0,23***
Control	3,40	,842	3,57	,912	**0,17***
I feel in complete control over how much energy I use					
Treatment	2,71	1,094	2,60	,986	-0,10
Control	2,54	1,101	2,37	1,064	-0,16

*: statistically significant change

Subjective norms

Subjective norms were measured through two items: an injunctive item (SN-1) and a descriptive item (SN-2). Statistically significant change is observed in the treatment group for the descriptive item (*t(85)=-2.417, p<.05*). This change shows an increase in the level that respondents think that the people who are important to them pay attention to their energy use.

Table 41 Mean values and standard deviations for subjective norms items (treatment and control group)

	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Most people who are important to me think that I should use less energy					
Treatment	2,10	,983	2,29	,944	0,19
Control	1,95	,885	2,05	,942	0,09
Most people who are important to me try to pay attention to their energy use					
Treatment	3,13	,865	3,42	,901	**0,29***
Control	3,11	,977	3,06	,862	-0,05

*: statistically significant change

Emotions

Emotions were measured with one item. Statistically significant change is observed in the control group (*t(154)=2.592, p<.05*). This change shows a decrease in the impact of energy saving on emotions.

Table 42 Mean values and standard deviations for emotion item (treatment and control group)

Doing things to save energy makes me happy					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Treatment	3,66	,889	3,71	,810	0,05
Control	3,55	1,001	3,32	,998	**-0,23***

*: statistically significant change

Role beliefs

Role beliefs were measured through one item. No statistically significant change is observed in any group.

Table 43 Mean values and standard deviations for role beliefs item (treatment and control group)

As a resident of a hall of residence I should be more concerned about my energy use during my stay there					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Treatment	3,33	,951	3,26	,984	-0,07
Control	3,13	,978	3,10	1,024	-0,03

*: statistically significant change

Intention

Finally, respondents were asked to indicate their intention to try harder to save energy over the next academic year through one item. No statistically significant change is observed in any group.

Table 44 Mean values and standard deviations intentions item (treatment and control group)

I intend to try harder to reduce my energy use this/next academic year					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Treatment	3,35	1,049	3,51	,891	0,16
Control	3,32	1,030	3,39	,964	0,08

*: statistically significant change

4.3.7 Determinants of energy saving

4.3.7.1 Incentives

Respondents were asked to select the three most important reasons for being more energy conscious from a list provided to them.

The three most important drivers of energy consciousness are common in both groups: it's a habit adopted from home; it saves energy, and; it helps reduce global warming. The fact that it is the right thing to do and the feel good factor are also high in the list in both groups. These reasons were the top drivers of energy saving in the baseline survey as well in both groups. Overall, no significant differences are observed in the ranking of drivers of energy consciousness between the two groups. It is worth

noticing, however, that the proportion of respondents from the treatment group selecting the "it saves energy" is 13% higher than the one in the control group.

In the treatment group the least important reasons for being more energy conscious are: those associated with other peoples' opinion namely: fitting in with other residents of the dormitory, other peoples' approval and someone else asking.

In the control group, someone else asking them to is not in the bottom three reasons. Instead, earning money or prizes out of it, is. The other two reasons are common in both groups. It is worth noting that in the baseline survey the bottom three reasons were common for both groups. Those were: fitting in with other residents of the dormitory, other peoples' approval and someone else asking.

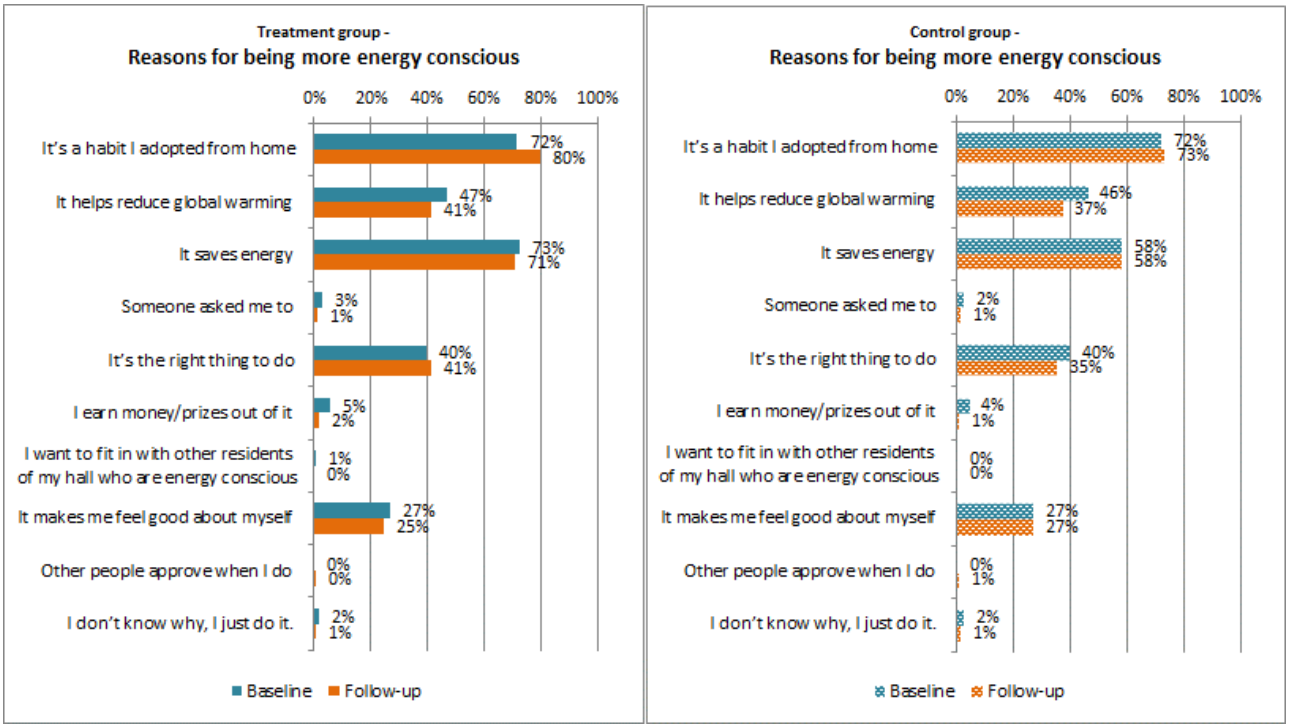

Figure 17 Reasons for being more energy conscious (treatment and control group)

4.3.7.2 Barriers

Respondents were asked to select the three most important reasons for being less energy conscious from a list provided to them.

The three most important barriers in energy saving are common in both groups: lack of energy consumption feedback; structural/system limitations, and; energy saving does not save them money. These three reasons were the top three reasons in the baseline survey as well in both groups.

The least important reasons for being less energy conscious are sustainable living not being for them, fear of being made fun of and lack of inspiration from the university/college to act in an energy saving manner. This trend remains unchanged from the baseline survey for both groups.

Overall, no significant differences are observed in the ranking of drivers of energy consciousness between the two groups in any of the baseline or follow-up survey.

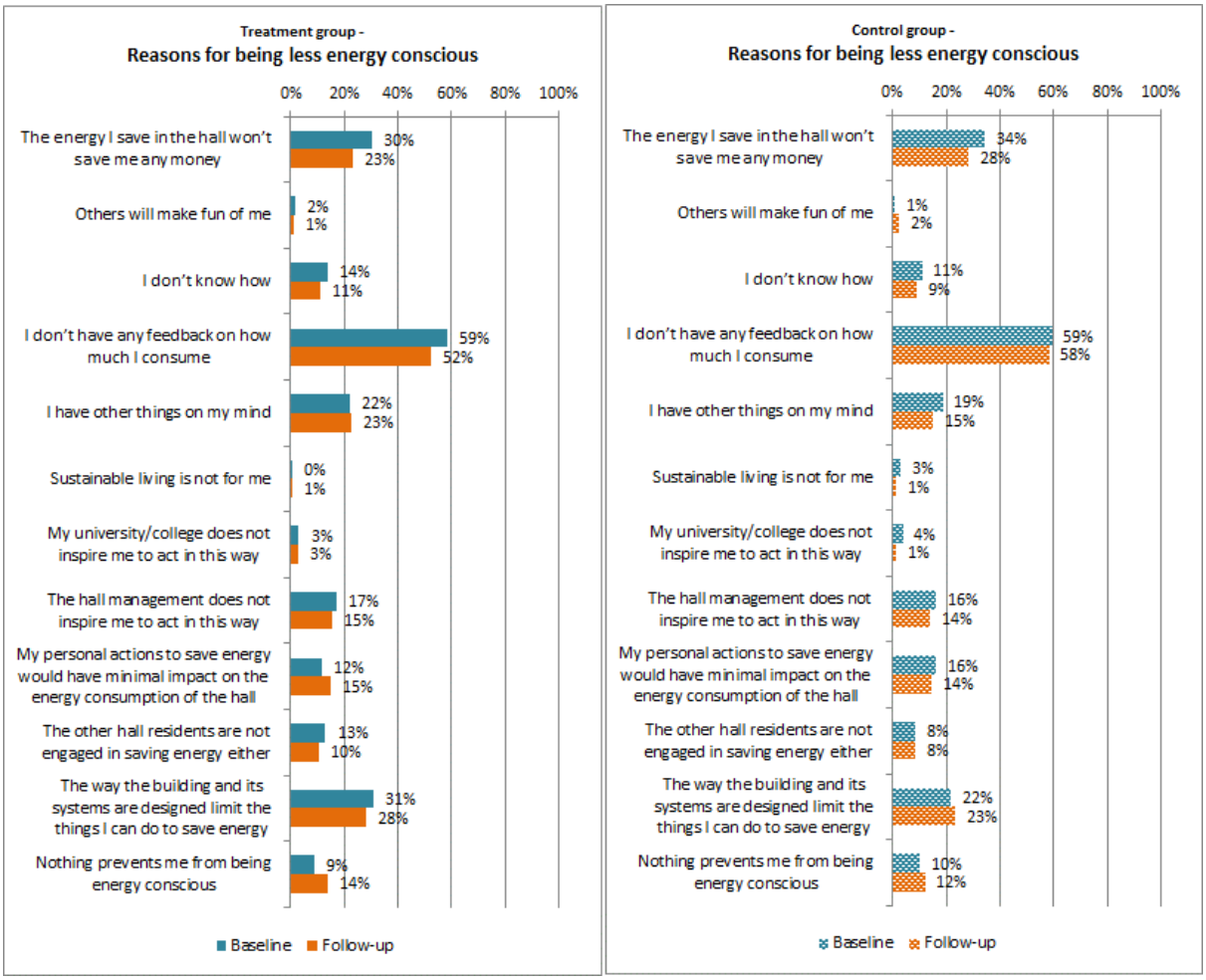

Figure 18 Reasons for being less energy conscious (treatment and control group)

4.4 Summary of main findings

The follow-up student questionnaire survey was circulated in all dormitories implementing the Student Switch Off campaign and to a control group in Linkoping, Sweden. Respondents to the follow-up survey, were matched with the respondents of the baseline survey through their email or name in order to be included in the pre- post- comparison evaluation. The response rate target of 615 has been achieved with a total of 613 matched respondents.

DEMOGRAPHICS

Gender

- A significantly large number of female, compared to male respondents participated in the survey in total.
- Differences found in gender between countries and between the treatment and control group are not statistically significant.
- The number of female respondents is higher than the number of male respondents in Cyprus, Lithuania, Sweden and the UK. The largest proportion of female respondents is found in Cyprus (79% female) while the largest percentage of male respondents is found in Greece (53% male).
- The proportion of female respondents in the treatment group is higher than the proportion of female respondents in the control group but it is not far from 50% in any case (53% female in the treatment group, 49% in the control group).

Age

- Significant differences in the age of respondents are found across countries and between the treatment and control group ($p<.001$).
- The biggest majority of respondents is between 17-24 years of age in all countries. In Cyprus and Lithuania 100% of respondents are between 17-24 years. In Sweden a large percentage of respondents (31%) is also between 24-35 years of age.
- The proportion of respondents in the treatment group that are 17-24 years of age is large (68% of respondents) but not as large as the proportion in the control group (86% of respondents).
- Almost one third of respondents from the treatment group are between 24-35 years of age while only 14% from the control group is in that age group.

Nationality

- Across individual countries and between the treatment and control group significant differences are found in the origin of the students studying there ($p<.001$).
- The majority of total respondents are native to the country they study in (65% of total). In the UK and in Sweden, students come from many parts of the world. On the other hand, in Lithuania and Greece students are only native. In Cyprus students are mostly native or from other EU countries.
- More than three quarters (82%) of the control group respondents are native while less than two thirds (59%) of the respondents from the treatment group are native. Forty one percentof the treatment group respondents are non-native. In the control group, the percentage of non-native is 18%.

Level of education

- Significant differences in the level of studies of the respondents are observed across individual countries and between the treatment and control group ($p<.001$).
- Overall, a good mix of students from different years and levels of education is found. The majority of respondents (70%) are undergraduates. Another 25% of respondents are doing their masters degree.
- A small number of respondents from the UK selected the "other" option. These students are mainly exchange students (Erasmus or international), top-up students or research associates.
- In Cyprus and Greece more than three quarters of the students are in third year or higher of their undergraduate studies. In Lithuania, almost all respondents (97%) are undergraduates. In the UK and Sweden a good mix between undergraduates and postgraduates is found.
- In the control group the proportion of first year students (35%) is more than double the proportion of the treatment group. In both groups a good mix of students from different years and levels of education is found. In the treatment group the proportion of postgraduate students (39%) is almost double the proportion of the control group.

Subject of study

- Respondents study all main subjects in all countries, but with significant differences in proportions across countries (p=.001). Differences are also found in the subjects of study between treatment and control group respondents (p<.01).
- Overall, the biggest percentage of respondents (36% of total) study architecture, engineering or technology and are assumed to have the best level of knowledge or awareness in energy saving issues.
- In Greece, the highest proportion of students studying architecture, engineering or technology, is found (59%). The lowest proportion (14%) is found in Cyprus.
- The biggest percentage of respondents study architecture, engineering or technology in both the treatment and control group but in the control group this proportion is much higher (57% for control group, 38% for treatment group). Some smaller differences are also found between the two groups for the remaining subjects of study.

LIFESTYLE

Energy saving efforts in future lifestyle

- A large shift towards an intention to make more energy saving efforts when they move out of dormitories is observed compared to the baseline.
- This positive shift is significant in all countries except for Lithuania.
- A positive shift towards a more energy efficient behavior is also observed in the control group but the change is more profound for the treatment group.

(PERCEIVED) LEVEL OF INFORMATION

Own energy consumption in dormitories

- Marginally significant differences (*p=.065*) between the baseline and follow-up survey are found in the level of information on what respondents personally consume in their dormitory. The change is towards a decrease of the level of knowledge (5% decrease in the mean value overall).
- At country level a marginally statistically significant increase is observed in Greece (*p=.056*) and a statistically significant decrease in the UK (*p<.001*). In all other countries a decrease is observed in the perceived level of information is also observed but it is not statistically significant.
- The increase observed in Greece is attributed to a campus-wide energy management program implemented this year in the Technical University of Crete. In all other countries the decrease in the (perceived) level of knowledge is attributed to the fact that the energy dashboard was not implemented this year.
- Significant differences in the level of knowledge are found between countries (p<.001). The highest level of perceived knowledge on what respondents personally consume in their dormitory is found in Greece and the lowest in Sweden.
- No statistically significant change between the baseline and the follow-up survey is found in any of the treatment or control groups.
- A slight decrease in the level of knowledge is observed in both groups. This decrease is marginally larger in the control group.
- The level of knowledge is at similar levels in the two groups and close to "badly informed".

How to save energy in dormitories

- Statistically significant differences (*p<.001*) between the baseline and follow-up survey are found in the level of information on what respondents can do to save energy in their dormitory. The change is towards an increase in the level of knowledge (13% increase in the mean value overall).
- An increase in the level of knowledge is observed in all countries. This change is statistically significant in Greece (p=.002) and in Sweden (*p<.001*).
- Significant differences in the level of knowledge are found between countries (p<.001). The highest perceived level of knowledge on what respondents can do to save energy in their dormitory is found in Cyprus and the lowest in Lithuania.
- Statistically significant change between the baseline and the follow-up survey is found in both treatment and the control group. However, the change is more significant for the treatment group (*p<.001).*
- An, increase in the level of knowledge of what respondents can do to save energy in their dormitory is observed in both groups. This increase is larger for the treatment group.
- The level of knowledge is at similar levels in the two groups and close to "neither badly nor well informed".

ENERGY AWARENESS

Increase in energy awareness

- Overall, the energy awareness of respondents has increased by "a little".
- There are no statistically significant differences in the level of increase in energy awareness between countries.
- The biggest increase in energy awareness is reported from Cyprus and the smallest from Lithuania.
- Differences between the treatment and the control group in increase of energy awareness are statistically significant (p=.014).
- The increase in the energy awareness in the treatment group is higher than in the control group.

Influential sources of information

- The top three sources of information that helped the most in increasing the energy awareness of respondents are: family (32% of total); an article they have read or a documentary they watched (31% of total) and; the Student Switch Off campaign (27% of total).
- The least influential sources of information are: feedback and information on their dormitory's energy consumption (10% of total); friends living in dormitories (12% of total) and; university courses (13% of total).
- Student Switch Off receives a high proportion of responses and is in the top three most influential sources of information in all individual countries except for Sweden.
- The top three sources of information that helped increase energy awareness are common between the treatment and control group. Those are: an article/documentary; family, and; a university course.
- The Student Switch Off campaign has influenced 12% of the respondents of the treatment and only 3% of the control group.

HABITS AND PRACTICES

- Overall, an increase, is observed at the end of the academic year, in the frequency that all targeted behaviours are performed compared to the beginning of the academic year.
- This increase is statistically significant for the case of avoiding leaving electronic equipment on stand-by ($p=.070$), putting a lid on pans when cooking ($p=.085$), and boiling only the right amount of water ($p<.05$) and in the range of 3-4%.
- The behaviors with the highest frequency of performance, and that can be considered as habits, are those of switching off lights in empty rooms and opening windows for cooling.
- In individual countries significant changes (increase in frequency) are found in the frequency that lights are switched off in empty rooms in Cyprus, a lid is put on pans when cooking in Greece and Sweden, the right amount is boiled with the kettle in Sweden and extra layers are put on instead of the heating in Sweden.
- The least performed action in Cyprus and the UK is that of putting a lid in pans when cooking. In Greece the action performed least often is that of putting an extra layer on instead of the heating. In Lithuania and in Sweden the action performed the least often is that of avoiding leaving electronic equipment on stand-by.
- Still, all actions are performed more often than "sometimes" in all countries.
- Visual comparison of the mean values for the treatment and the control group suggests similarities in the frequency that the targeted actions are performed in the two groups.
- In the case of the treatment group an increase is observed in the frequency that four out of six targeted behaviours are performed. A marginal decrease is only observed in the case of switching off lights and opening windows for cooling.
- Change in the treatment group is statistically significant for the action of putting a lid on pans when cooking ($p<.05$), for boiling only the right amount of water ($p=.077$) and putting extra layers on instead of the heating ($p=.075$) and increase is in the range of 5-6%.
- In the case of the control group a decrease is observed in the frequency that three out of six targeted behaviours are performed. A statistically significant decrease occurred in the frequency that lights are switched off in empty rooms ($p<.05$). A significant increase is observed only in the frequency that the right amount of water is boiled in the kettle ($p<.05$) and is at the level of 5%.

BEHAVIORAL ANTECEDENTS

- Overall, visual comparison shows differences in the mean values of almost all items of behavior change theory and models between the baseline and follow-up survey. Changes are statistically significant for five out of thirteen studied items.
- Changes are observed in at least one item from each of the three investigated behaviour change theory and models but no single theory or model is verified with change in all its relevant variables.
- At the end of the academic year, respondents find it easier to reduce their energy use (perceived behavioural control, $p<.05$). This could be due to the increase in their energy awareness and to the level of knowledge of what they can do to save energy in their dorms.
- Also, respondents think more that most people who are important to them try to pay attention to their energy use (subjective norm, $p<.05$). A reason for this could be the fact that friends of the respondents living in the dorms are doing more to save energy as part of the campaign or because due to the increase of their energy awareness they are now more observant of family and friends acting in an energy efficient way.
- Contrarily, respondents feel less in control over how much energy they use (perceived behavioural control, $p=.055$). This could be attributed to the lack of energy consumption information but also to barriers such as structural or system limitations of the dorms.
- Also, respondents think less that energy conservation contributes to a reduction in climate change impacts (awareness of consequences, $p<.05$). Nonetheless, the mean value indicates high awareness of consequences in both the baseline and the follow-up survey.
- Respondents also think less that as residents of a dormitory they should be more concerned about their energy use there (role beliefs, $p<.05$). This may be because they feel they are already doing a lot to save energy or because they think that everyone including dormitory managers should be doing more to save energy in their dormitories.
- Visual comparison of the mean value diagrams shows similarities (similar trends) in the mean values for all items between the treatment and control group.
- Changes in the treatment group appear to be greater than the ones in the control group.

Personal norms

- In Sweden an increase in the feeling of moral obligation to save energy is observed.

Ascription of responsibility

- In Lithuania a significant decrease in the ascription of responsibility for climate change is found.

Awareness of consequences

- In the UK, respondents appear less aware of consequences from energy consumption at the end of the academic year. However, the mean values indicate high awareness of consequences in both the baseline and the follow-up survey.

Attitudes

- No statistically significant change is observed in attitudes in any of the countries or the control group.

Perceived behavioural control

- In Sweden and in Greece a significant increase in the perception of how easily personal energy use can be reduced is found.
- A significant increase in the perception of how easily personal energy use can be reduced is found in the control group as well.
- In the UK a decrease in the perception of control over personal energy use is observed.

Subjective norms

- In Sweden and in the UK an increase in the level that respondents think that the people who are important to them pay attention to their energy use is found.

Emotions

- No statistically significant change is observed in any country.
- A significant decrease in the impact of energy saving on emotions is found in the control group.

Role beliefs

- In Cyprus and in the UK a decrease in the role belief that as residents of dormitories respondents should be more concerned about their energy use there is found.

Intention

- Finally, a significant decrease in the intention to save energy in the coming academic year is found in Lithuania.

DETERMINANTS OF ENERGY SAVING

Incentives

- Overall, the two most important reasons for being more energy conscious are:
  - it is a habit students adopted from home, and
  - it saves energy.
- The third reason in the top three list varies per country. In Cyprus, Greece and Lithuania the third reason is "it makes me feel good about myself" while is Sweden the third reason is "it helps reduce global warming" and in the UK it is "it's the right thing to do".
- Between the baseline and follow-up survey there is no change in the items in the top three list in any country or in total.
- Others asking them to save energy, earning prizes out of it, gaining approval of other people and fitting in with other energy conscious residents of the dormitory seem to have minimal impact on respondents' energy consciousness in all individual countries. These reasons had the minimum impact during the baseline period in all individual countries as well.
- Compared to the baseline period there is a significant increase (8% more respondents of total) in those saying that energy saving is a habit they adopted from home and a significant reduction (7% less respondents of total) in those saying that they are more energy conscious because it helps reduce global warming.
- The three most important drivers of energy consciousness are common between the treatment and control group: it's a habit adopted from home; it saves energy, and; it helps reduce global warming. The fact that it is the right thing to do and the feel good factor are also high in the list in both groups.
- Between the baseline and follow-up survey there is no change in the items in the top reasons list in any of the two groups.
- Overall, no significant differences are observed in the ranking of drivers of energy consciousness between the treatment and control groups. It is worth noticing, however, that the proportion of respondents from the treatment group selecting the "it saves energy" option is 13% higher than the one in the control group.

Barriers

- The top reasons for being less energy conscious vary between countries. Therefore, a common trend cannot be identified. Only the lack of energy consumption feedback has a common ranking in all countries and it is in fact the number one reason for being less energy conscious in all countries.
- A difference in the ranking of top reasons is also found between the baseline and follow-up in individual countries. Only in Sweden the ranking of top reason remains unchanged between the baseline and follow-up survey.
- Lack of energy consumption feedback was not the top reason for being less energy conscious in Lithuania and Cyprus in the baseline survey.
- In Cyprus the biggest change between the baseline and follow-up survey is in the lack of energy consumption feedback (21% increase of responses) and structural/system limitations of the building (21% increase of responses). In Greece a 67% decrease is observed in the number of respondents that say that saving energy in their dormitory won't save them any money. Another important observation for Greece is the increase of the number of respondents (12% increase) that think that others will make fun of them. In Lithuania there is a 75% increase in the number of respondents saying that the lack of energy consumption feedback is a reason for being less energy conscious. In Sweden a 22% decrease is observed in those that say that saving energy won't save them any money. In the UK there is a 34% decrease in the number of respondents that say that they don't know how to save energy and to those saying that their personal actions to save energy will have minimal impact on energy.
- Overall, no significant differences are observed in the ranking of drivers of energy consciousness between the treatment and the control group in any of the baseline or follow-up survey.
- The three most important barriers in energy saving for the treatment and control group are: lack of energy consumption feedback; structural/system limitations, and; energy saving does not save them money.
- The least important reasons for being less energy conscious for the treatment and the control group are: sustainable living not being for them, fear of being made fun of and lack of inspiration from the university/college to act in an energy saving manner.

Appendix A – Follow-up questionnaire survey (UK version)

1. Name

First name

Last name

*** 2. Email address**

Email

*** 3. How informed do you feel about:**

	Very badly informed	Fairly badly informed	Neither well nor badly informed	Fairly well informed	Very well informed
the energy you personally consume in your hall?	○	○	○	○	○
what you personally can do to save energy in your hall?	○	○	○	○	○

*** 4. Please consider each of the actions below, and indicate how often you take them.**

	Never	Rarely	Sometimes	Often	Always
Switch off lights in empty rooms	○	○	○	○	○
Avoid leaving electronic equipment on stand-by	○	○	○	○	○
Put a lid on pans when cooking	○	○	○	○	○
Boil the kettle only with the amount of water you intend to use	○	○	○	○	○
Put a jumper or an extra blanket before deciding to turn on the heating	○	○	○	○	○
Open windows to cool down before deciding to use a cooling device or system	○	○	○	○	○

*** 5. Considering only the energy saving actions in the previous question that you take most frequently, please choose up to three reasons why you undertake these actions.**

	Most important reason
It's a habit I adopted from home	
It helps reduce global warming	
It saves energy	
Someone asked me to	
It's the right thing to do	
I earn money/prizes out of it	
I want to fit in with other residents of the hall who are energy conscious	
It makes me feel good about myself	
Other people approve when I do	
I don't know why, I just do it.	

Other (please specify)

*** 6. Again, considering the energy-saving actions, please choose up to three reasons that prevent you from being more conscious about your energy use in your hall, from the list below.**

	Most important reason
The energy I save in the hall won't save me any money	
Others will make fun of me	
I don't know how	
I don't have any feedback on how much I consume	
I have other things on my mind	
Sustainable living is not for me	
My university/college does not inspire me to act in this way	
The hall management does not inspire me to act in this way	
My personal actions to save energy would have minimal impact on the energy consumption of the hall	
The other hall residents are not engaged in saving energy either	
The way the building and its systems are designed limit the things I can do to save energy	
Nothing prevents me from being energy conscious	

Other (please specify)

*** 7. This section of the questionnaire is designed to find out about your opinions and attitudes to different issues. Please consider each of the statements below, and indicate to what extent you agree or disagree with it.**

	Strongly Disagree	Disagree	Neither Disagree Nor Agree	Agree	Strongly Agree
I can reduce my energy use quite easily	○	○	○	○	○
I feel guilty when I use a lot of energy	○	○	○	○	○
Most people who are important to me try to pay attention to their energy use	○	○	○	○	○
Doing things to save energy makes me happy	○	○	○	○	○
I feel in complete control over how much energy I use	○	○	○	○	○
Energy conservation contributes to a reduction of climate change impacts	○	○	○	○	○
Saving energy means I have to live less comfortably	○	○	○	○	○
Most people who are important to me think that I should use less energy	○	○	○	○	○
Saving energy is too much of a hassle	○	○	○	○	○
As a resident of a hall of residence I should be more concerned about my energy use during my stay there	○	○	○	○	○
Everyone including myself is responsible for climate change	○	○	○	○	○
I feel morally obliged to save energy	○	○	○	○	○
I intend to try harder to reduce my energy use next academic year	○	○	○	○	○

*** 8. How much has your awareness of what you can do to reduce the impact of your lifestyle and habits on energy consumption increased since the start of this academic year?**

- ○ A great deal
- ○ A fair amount
- ○ A little
- ○ Not very much
- ○ Not at all

*** 9. What have been the main sources, if any, of information that have made you more aware of what you can do to reduce your energy consumption? [Select all that apply]**

- ☐ Friends living in halls of residence at my university
- ☐ Family
- ☐ University-wide campaigns
- ☐ The Student Switch Off campaign
- ☐ Feedback and information about my hall's energy consumption
- ☐ An article I read or a documentary I watched
- ☐ A course I took at university
- ☐ Other (please specify)

*** 10. Have you been aware of or seen any of the following activities during the past few months in your halls of residence? [Select all that apply]**

- ☐ Posters about energy saving
- ☐ Climate change quiz (online or on paper)
- ☐ Other residents of your hall talking to you about energy conservation
- ☐ Facebook photo competitions on energy saving
- ☐ League-table on energy consumption in which your hall was included
- ☐ Dormitory staff members talking to you about energy saving
- ☐ Stalls on your campus informing you about energy saving
- ☐ Training workshops or talks about energy saving within your hall
- ☐ I haven't noticed any of these activities during the past few months

*** 11. NEW_Have you heard of the Student Switch Off campaign?**

- ○ Yes
- ○ No

*** 12. In what ways has Student Switch Off influenced you? [Select all that apply]**

- ☐ It helped me meet other people who were also trying to do the same
- ☐ It made me aware of the impact of my lifestyle and habits
- ☐ It gave me the opportunity to become a Student Switch Off ambassador
- ☐ I was given information on where to go for advice on energy saving actions i can take
- ☐ I saw practical examples on what other people do to save energy
- ☐ It showed me that my university is taking action to reduce its environmental impact
- ☐ It showed me that students at other universities are taking action to reduce their environmental impact
- ☐ It made me confident that i could actually do things to reduce my environmental impact
- ☐ It made it easier for me to reduce my environmental impact
- ☐ Student Switch Off has not influenced me
- ☐ Other (please specify)

13. Do you have any suggestions for improving the Student Switch Off campaign?

Please think about how the campaign is communicated, how prizes and rewards are used and how to get students involved.

Please write your answer in the box below.

*** 14. Which one of these statements best describes how you think you will be living when you move out of halls of residence?**

- I think I'll be doing a lot more to save energy
- I think I'll be doing a bit more to save energy
- I think I'll probably be doing about the same to save energy
- I think I'll be doing a bit less to save energy
- I think I'll be doing a lot less to save energy
- Don't Know

Appendix B – Variables from behaviour change theory and models

Variable	Item code	Items	NAM	TPB	TIB
Personal norms	**PN-1**	I feel morally obliged to save energy, regardless of what other people do	√		√
	PN-2	I feel guilty when I use a lot of energy			
Ascription of responsibility	**AR-1**	Everyone including myself is responsible for climate change	√		
Awareness of consequences	**AC-1**	Energy conservation contributes to a reduction of the climate change impacts	√		
Attitude	**ATT-1**	Saving energy is too much of a hassle		√	√
	ATT-2	Saving energy means I have to live less comfortably			
Perceived behavioural control (self-efficacy and controllability)	**PBC-1**	I can reduce my energy use quite easily		√	
	PBC-2	I feel in complete control over how much energy I use			
Subjective norm (injunctive and descriptive)	**SN-1**	Most people who are important to me think that I should use less energy		√	
	SN-2	Most people who are important to me try to pay attention to their energy use			
Emotions	**EMO-1**	Doing things to save energy makes me happy			√
Role beliefs	**ROL-1**	As a resident of the dorms I should be more concerned about my energy use during my stay there			√
Intention	**INT-1**	I intend to try harder to reduce my energy use this academic year		√	√

NAM: Norm Activation Model
TPB: Theory of Planned Behaviour
TIB: Triandis' Theory of Interpersonal Behaviour