



Co-funded by the Intelligent Energy Europe
Programme of the European Union

Project Acronym: SAVES

Project Title: Students Achieving Valuable Energy Savings

Contract Number: IEE/13/719/SI2.675836

Project Duration: 01/04/2014 – 31/03/2017

Deliverable reference number and title:

D3.3: Quantifying the behavioural change and energy savings – Year 2

July 2016

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Executive Summary

Student Switch Off (SSO) is an inter-dormitory energy-saving competition run in 17 different university housing providers, housing 24,976 students in five countries over the academic years 2014/15 and 29,870 in 2015/16 respectively (54,846 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 report 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 2015-2016.

ENERGY SAVINGS

Monitored data for 2015-16 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 a control group located in Linköping, 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 2015-16, 2,547 MWh (over 2.5 GWh) of electricity were saved across all the participating countries compared to the baseline. This 8.8% saving equates to over 1,107 tonnes of CO₂ emissions. Most absolute savings were achieved in the UK (1,690 MWh, 908 tonnes CO₂), the greatest percentage saving was achieved in Cyprus (41.2%). Greece reported the lowest savings both in absolute terms (15 MWh, 10.79 tonnes CO₂) and in percentage terms (0.9%).

Table 1 shows the breakdown of savings across all participating countries. Whereas in some countries there were high energy savings (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 MWh, percentage and carbon dioxide savings calculated from meter readings

	United Kingdom	Sweden	Lithuania	Greece	Cyprus	TOTAL
Baseline (MWh)	20340	2706	4153	1661	244	29104
Usage (MWh)	18650	2377	3739	1646	143	26556
Extrapolated saving (MWh)	5	244	12	0	0	260
Total saving (MWh)	1690	330	413	15	101	2548
% saving	8.3%	12.2%	9.9%	0.9%	41.2%	8.8%
CO ₂ savings (tonnes)	908	6	109	11	73	1,107

EXTRAPOLATED SAVINGS

The majority of the savings were calculated based on direct meter readings. In a number of cases where data was missing or erroneous, savings were extrapolated based on average savings per student per day to ensure that all savings are included. Extrapolated savings account for 10.2% of total reported energy savings. Only 0.9% of reported CO₂ emissions were from extrapolated data. This is because most of the extrapolated savings were recorded in Sweden and Lithuania where CO₂ emissions factors are relatively low.

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 Linköping, Sweden.

Almost one third of total respondents lived in dorms of their current dormitory provider/university the previous academic year. At country level this is mostly the case for Cyprus (73%), Greece (67%), Lithuania (60%) and Sweden (59%). These residents are more likely to have heard of or been involved in Student Switch Off the previous year. For 93% of the respondents in the UK this is the first year that the students are living in dorms of their current dormitory provider /university.

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.

Out of the six targeted energy saving actions an increase is observed in the frequency that the less known energy saving actions are performed, namely putting a lid on pans when cooking and boiling only the right amount of water. The changes are statistically significant for both behaviours. In individual countries significant increases in frequency that an energy saving action is performed are found that a lid is put on pans when cooking (in Cyprus and Sweden) and that the right amount of water is boiled with the kettle (in Greece and the UK).

Table 2 Changes in energy saving behaviours (country and project level)

Action	Cyprus	Greece	Lithuania	Sweden	UK	Total
Switch off lights in empty rooms	-2%	0%	-4%	0%	0%	-1%
Avoid leaving electronic equipment on stand-by	6%	7%	-2%	-3%	-1%	-2%
Put a lid on pans when cooking	*16%	9%	0%	*5%	3%	*4%
Boil the kettle only with the amount of water you intend to use	14%	*17%	*-8%	3%	*6%	*3%
Put an extra layer on before deciding to turn on the heating	-4%	*-15%	-3%	-1%	1%	0%
Open windows before deciding to use a cooling device or system	-2%	6%	1%	-1%	0%	0%

*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 Greece and the smallest from Lithuania.

Indicative of the increase in awareness is the large proportion of respondents that intend to do about the same to save energy when they move into private accommodation and will be paying for their own bills. In Sweden, the highest proportion of such students is found.

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

At the end of the academic year, respondents think more that saving energy means they have to live less comfortably. This change in *attitudes* has a negative meaning as it implies an increase in the level that respondents think that saving energy means they have to live less comfortably. In *emotions* no change is found. In all other items a change with a positive meaning is observed (*personal norms*, *ascription of responsibility*, *awareness of consequences*, *perceived behavioural control*, *role beliefs*).

At country level, a significant increase in the feeling of moral obligation to save energy (*personal norms*) is observed in Greece. In Greece and in Sweden a significant increase in the *ascription of responsibility* for climate change is also found. A somewhat statistically significant increase in *awareness of consequences* from energy consumption is observed in Sweden (treatment group). In the UK a statistically significant increase is observed in the level that respondents think that saving energy means they have to live less comfortably (*attitudes*). A statistically significant increase in the *role belief* that as residents of dormitories respondents should be more concerned about their energy use there is observed in Greece, while a somewhat significant change towards the opposite direction is observed in Lithuania.

The fact that it is a habit adopted from home is in the top three *reasons for saving energy* in all countries. The second and third reason varies between countries. In Lithuania, Sweden and the UK "it saves energy" and "it's the right thing to do" are the other two top reasons for being more energy conscious. In Cyprus they are "it saves energy" and "it makes me feel good about myself" while in Greece the other two top reasons are "it helps reduce global warming" and "it makes me feel good about myself".

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. Building structure and systems is in the top three reasons for all countries except for Lithuania. A difference in the ranking of top reasons is also found between the baseline and follow-up survey responses in individual countries. However, lack of energy consumption feedback was in the top three reasons for being less energy conscious in the baseline survey in all countries as well. In the baseline survey limitations in the building structure and its systems was in the top three reasons for Sweden only.

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 1.2% were reported in the control group, however, more energy was saved in the dormitories that had Student Switch Off intervention (12.2% savings).

Table 3 MWh, percentage and carbon dioxide savings in the control and treatment groups

	Control group	Treatment group (with adjustment)
BASELINE (MWh)	3332	2706
Usage (MWh)	3292	2377
Reduction (MWh)	39	330
% change	1.2%	12.2%
CO₂ savings (tonnes)	1	6

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. In age, nationality, level of education and subject of study the differences between the two groups are 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.

The proportion of respondents from the treatment group that think that they will be doing about the same to save energy when they move out of dorms is higher in the treatment group. A very small number of respondents of the treatment group also think that they will be doing a bit less. A higher proportion of respondents from the control group think that they will be doing more to save energy when they move out of dorms. The results either suggest that the respondents of the treatment group are doing enough already to save energy and intend to continue this behavior when they move into private accommodation or that they are not doing enough but intend to do more when they move out of dorms.

In the treatment group a slight increase is observed in the perceived level of knowledge of what respondents personally consume in their dorms while for the control group a slight decrease is observed. The level of knowledge is at similar levels in the two groups and close to "badly informed".

An 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, however, is larger for the treatment group.

An increase in energy awareness on what respondents 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 not statistically significant but the reported increase in the treatment group is greater than in the control group.

The top two sources of information that helped increase energy awareness are common between the treatment and control group. Those are: an article/documentary and family. The Student Switch Off campaign is the third most influential source of information for the treatment group with 40% of the respondents selecting it. Only 2% of the control group were influenced by Student Switch Off.

In the treatment group a statistically significant increase is observed in the frequency that a lid is put on pans when cooking. In the case of the control no statistically significant increase is observed for any of the targeted energy saving behaviours. However, a statistically significant decrease occurred in the frequency that lights are switched off in empty rooms.

A common trend is observed in the mean values for the items of behavior change theory and models between the two groups. However, changes observed in the treatment group appear to be greater than the ones in the control group for the majority of variables. Significant changes are observed in some of the items in both groups, but are more positive and more profound in the treatment group. Significant changes are observed only in the treatment group in two variables. A significant increase is observed in the ascription of responsibility for climate change and in awareness of energy consumption contribution to climate change.

The top two important drivers of energy consciousness are common for the treatment and control group. Those are: it's a habit adopted from home and it saves energy. The third most important reason is different for the two groups. In the treatment group the third most important reason is "it's the right thing to do", while in the control group it's "it helps reduce global warming". These reasons were the top drivers of energy saving in the baseline survey as well in both groups. The least important reasons for being more energy conscious are common for both groups and are those associated with other peoples' opinion namely: fitting in with other residents of the dormitory, other peoples' approval and someone else asking. Overall, no significant differences are observed in the ranking of drivers of energy consciousness in the control group. The differences are at the level of 0% to 3%. In the treatment group the level of change is higher for a number of items in the list. The proportion of students selecting "it saves energy" has increased by 5%, while for those selecting "it's the right thing to do" it has increased by 7%.

The three most important barriers in energy saving are common between the treatment and control 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 for the treatment group while in the control group lack of inspiration from the dormitory management was in the top three reasons instead of structural/system limitations. The least important reasons for being less energy conscious in both groups 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.

RETENTION OF ENERGY SAVING BEHAVIOURS WHEN MOVING OUT OF DORMS

A questionnaire survey was also conducted with students who lived in participating dormitories in 2014/15 but moved into private accommodation in 2015/2016. The aim of this survey was to help identify whether the energy-saving actions established during their time in dormitories have been carried forward. The findings suggest a significant impact from Student Switch Off on respondents while living in dorms and a retention of the energy saving habits in their current lives outside dorms.

- When living in dorms the awareness on how to save energy increased as a result of information/posters/messages students received from the Student Switch Off campaign for 68% of the respondents

- Seventy per cent of respondents took action to save energy as a result of the SSO campaign last academic year.
- From the 70% of respondents that took action to save energy as a result of the SSO campaign last academic year almost all of them (99% of respondents) continue to take those actions in their current life.
- The majority of respondents (74% of respondents) continue to take energy saving actions in their current lives to save money. A large number of respondents also continue to take the energy saving actions because they have gotten into the habit of saving energy (56% of respondents) and to take personal action on climate change (48% of respondents). Encouragement from flatmates and saving time are not popular reasons for taking energy saving actions (3% and 6% of respondents, respectively).
- The frequency in which respondents take the six energy behaviours targeted by Student Switch Off are similar to that of students living in dorms. No statistically significant differences are found between the two groups of respondents for any of these behaviours.
- The behaviours applied at the highest frequency are those of switching off lights in empty rooms and opening windows for cooling through ventilation. The behaviour applied least frequently is that of avoiding leaving electronic equipment on stand-by.

1. Introduction

Student Switch Off (SSO) is an inter-dormitory energy-saving competition run in 17 different university housing providers, housing 24,976 students in five countries over the academic years 2014/15 and 39,870 in 2015/16 respectively (54,846 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 report 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). It presents the energy savings and quantifiable behaviour changes relating to energy conservation that could be attributable to the project.

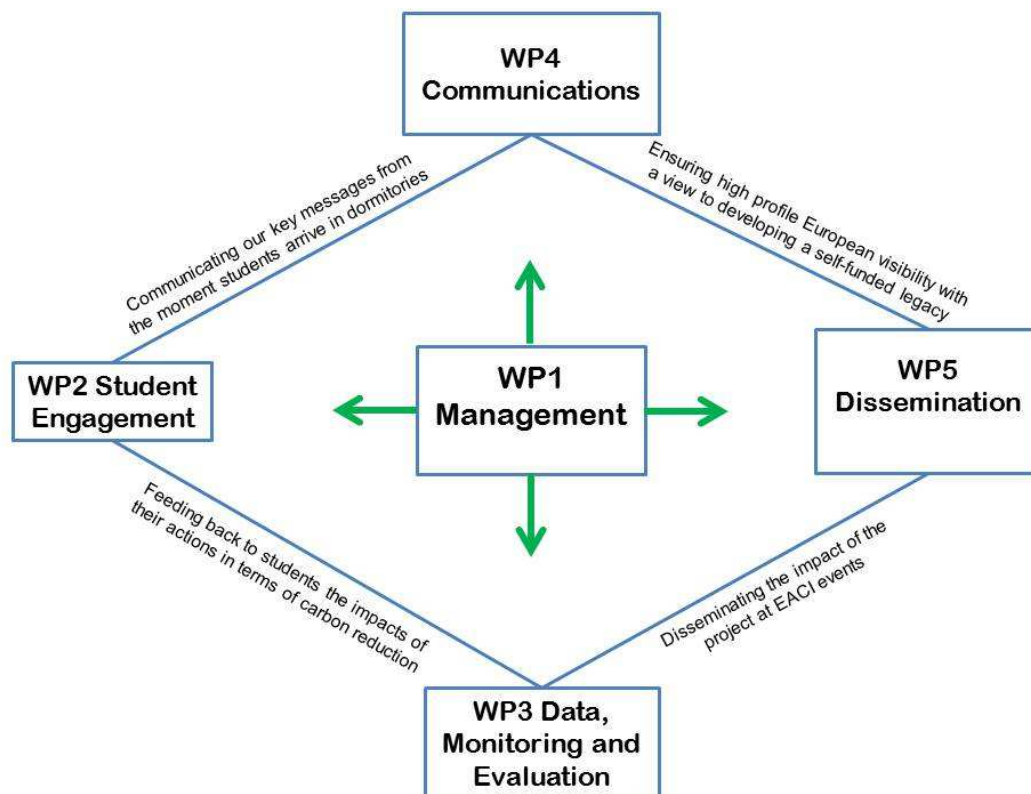


Figure 1 Overview of the SAVES project

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 (1,479 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 tCO₂e/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 behaviours¹. 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 2 (academic year 2015-16) 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
- c) Retention of behaviours when moving out of dorms

These are estimated with the help of the following means:

1. *Baseline energy use*

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

2. *Monitored energy use*

All dormitory providers are required to monitor their energy consumption. Many have automated meter-reading (AMR) systems in place whilst others are still manually reading meters. To that end, for the purposes of this baseline manual data has been gathered.

3. *Baseline questionnaire survey*

All students in participating dormitories will be encouraged to complete an incentivized online baseline survey before their local energy-saving competitions are established, so we can identify existing energy-saving attitudes, behaviours and habits (September 2014; September 2015).

4. *Follow-up questionnaire survey*

All students that completed the baseline survey will be encouraged to complete a follow-up survey close to the end of the academic year (May 2015; May 2016). Pre- and post-competition surveys will be analysed to identify attitudinal, behavioural and habitual changes relating to energy conservation that could be attributable to the project. A copy of the questionnaire survey is found in Appendix A.

5. *Questionnaire survey for students that have moved out of dormitories*

In the second year, questionnaire surveys were 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. A copy of the questionnaire survey is found in Appendix D.

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)

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 (1,479 tCO₂e / 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 five 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 questionnaire survey 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.

For the questionnaire survey involving the students that have moved out of dorms the second year of the campaign the emails of the respondents to the follow-up survey of year 1 will be used.

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-competition energy use). Pre- post-comparison will also be performed for all of the identified independent variables measured through the questionnaire survey 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 are 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-competition 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 service, 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 are required:

1. Monthly total electricity use data (kWh):
 - a) For the baseline period (at least twelve 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. Energy use and savings will be presented as kWh/resident.
4. Questionnaire survey data
 - a) Demographics
 - b) Energy related lifestyle and information levels
 - c) Socio- Psychological
 - d) Habits.

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 Appendix D). 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 for the students living in dorms contains questions covering the following topics, and is 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) existing energy related knowledge but also the current energy related lifestyle and intention to change 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 for energy saving. To identify incentives and barriers for energy saving.

A copy of the questionnaire is found in Appendix A.

The questionnaire survey for the students that have moved out of dorms the second year of the campaign covers the following topics:

- Impact of Student Switch Off campaign while living in dorms.

- Retention of energy saving behaviours adopted through Student Switch Off in private accommodation.

The questionnaire surveys were translated in all participating country languages (English, Greek, Lithuanian and Swedish). An online version was created for each of the translated versions with the help of SurveyMonkey software³.

The link to the online surveys was 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 questionnaire survey for the students that live in private accommodation was circulated close to the end of the first semester.

The target response rate for the baseline survey was 15%, while a 15% response rate of the baseline survey responses 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 for both the baseline and follow-up surveys, while country specific incentives were also provided (i.e. additional cash draw or chocolate) were offered only for the baseline survey. The questionnaire survey for students that have moved into private accommodation did not have a target response rate but it did have 2 x €25 cash prizes associated to it as project wide incentives for participation.

2.2.5 Study Variables

Energy use and energy savings may well 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 evaluation of the Student Switch Off campaign are explained below.

2.2.5.1 Dependent variables

Energy use

For the baseline period total electricity use will be calculated based on billing or metered data.

Energy Savings

Energy savings will be estimated 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.

2.2.5.2 Independent variables

The variables presented below are the study variables considered in year 2 of the campaign and address students living in dormitories. Changes in variables had impact only on two questions of the survey (one removed entirely, one shortened). A description of these variables is found in Appendix B.

Demographics

Demographical 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
- Living in dorms status

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*

³ www.surveymonkey.com

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 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 Model⁴ (NAM), the Theory of planned behaviour⁵ (TPB) and the Triandis' Theory of Interpersonal Behavior⁶ (TIB) have been selected (see Appendix C). Responses are given on a five-point scale with scores ranging from 1 'Strongly disagree' to 5 'Strongly agree'. 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. Personal norm was measured with the item "I feel morally obliged to save 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.

Ascription of responsibility was measured with the item "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 the 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.

Attitude toward energy saving was measured with the item "Saving energy means I have to live less comfortably".

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.

- *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 the item "I feel in complete control over how much I use".

- *Emotions (EMO)*

Emotional reactions towards a given behaviour are considered capable of changing that behaviour. Emotions were measured through the 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'.

Role beliefs were measured through the item "As a resident of the dorms I should be more concerned about my energy use during my stay there".

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 for 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 were measured through the following questions:

- *Incentives*

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

Retention of behaviours

An additional questionnaire survey was circulated in year 2 to the respondents of the follow-up survey in year 1 that had moved into private accommodation the next year. The following were measured:

- *Increase of energy awareness when living in dorms*

The increase of awareness on how to save energy as a result of the SSO campaign was measured with one item. Responses were given on a four-point scale with scores ranging from 1 'Yes, a lot' to 4 'No change at all'. The higher the score the smaller the increase of energy awareness.

- *Actions taken to save energy when living in dorms*

The level of influence of SSO in taking action for energy saving was measured with one item. Responses were given on a four-point scale with scores ranging from 1 'Yes, a lot' to 4 'No, not at all'. The higher the score the smaller the level of influence.

- *Retention of behaviours in private accommodation*

The level of retention of behaviours in private accommodation was measured with one item. Responses were given on a four-point scale with scores ranging from 1 'Yes, a lot' to 4 'No, not at all'. The higher the score the smaller the level of retention of behaviours. This question was only answered by those responding with "Yes, a lot", "Yes, a fair amount" and "Yes, a little" to the previous question.

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

- *Reasons for retaining behaviours*

The reasons for retaining the behaviours adopted as an effect of SSO in private accommodation was measured through one question. A list of 5 options was provided along with an open text option.

- *Habits*

The frequency that each of the six targeted behaviours is undertaken in current lives 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. This helps establish if there are different priorities and habits when living in private accommodation.

2.2.7 Data analysis

Analysis of energy data

This task is about the development of a methodology for setting baseline consumption and the calculation of energy savings. A methodology was developed based on the International Measurement and Verification Protocol (IPMVP) and the "eeMeasure" methodology (<http://eemeasure.smartspaces.eu>) developed for the EC ICT Policy Support Programme (ICT-PSP). This includes a methodology for the establishment of a baseline at each dormitory and a common approach for calculating and reporting savings.

Consumption data collected at each dormitory in the baseline period will be used to establish consumption models. These models will provide a basis for comparison over the project period to quantify energy savings. Baseline reports were provided at the beginning of the campaign (see [D3.2 from Year 1](#)) and are followed by savings reports at the end of each academic year the campaign is implemented.

The proposed methodology included the following elements:

- kWh electricity consumption data collected from the 2013/14 academic year for each dormitory to form their baseline (or earlier years, in the case of the UK, where the campaign had run previously)
- All partners have been asked to record this data from September 2013 and most have data pre-dating this time
- For participating UK Universities already hosting the Student Switch Off campaign, the pre-intervention data already collected will form the baseline (pre-2013)
- The electricity consumption data for each dormitory during the academic years 2014/15 and 2015/16 will be compared against the baseline data from that dormitory – so they are competing to beat their own baseline usage
- Initially the comparisons will be updated on a month-by-month basis for most dormitories as that is how frequently the meters are read
- The smart meter element of the project, which will be developed during year 1 of the project, will allow the energy savings to be viewed on an online dashboard
- The dormitories will compete on the basis of which can reduce their electricity consumption by the greatest percentage compared to their own baseline
- The energy dashboard will be able to show a leaderboard of how the dormitories from across all five countries are performing and rank them in terms of their percentage reduction
- When we start running the project it's possible that the proposed methodology may provide an advantage to certain dormitories in which case it will be revisited and amended as necessary

Analysis of questionnaire data

Descriptive statistics are used to describe the basic attributes of the sample at project level and at country/group 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 2013 through to June 2014 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 and 2015-16 data were 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 where data for a month was missing or erroneous, it was extrapolated based on the average of the data available for other months. For the majority of dormitory providers eight months' worth of data was compared, in a few dormitories nine months' worth of data was used. In 2015-16 energy savings were fed back through the energy dashboard 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 (tonnes CO₂) 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 2015-16, 2,548 MWh of electricity were saved across all the participating countries. This equates to an 8.8% saving compared to the baseline and a saving of 1,107 tonnes of carbon dioxide and 219 tonnes of oil equivalent. The majority of this saving was calculated based on direct meter readings (Table 4). In a number of cases where data was missing or erroneous, it was extrapolated to ensure that all savings are reported; Table 4 also illustrates the additional energy and carbon dioxide that the project is expected to have saved.

Table 4 Project MWh, percentage and carbon dioxide savings calculated from meter readings

	Measured	Extrapolated	Total
Baseline (MWh)	27221	1883	29104
Usage (MWh)	24934	1622	26556
Saving (MWh)	2287	261	2548
Saving (%)	8.4%	13.9%	8.8%
CO ₂ saving (tonnes)	1,099	8	1,107

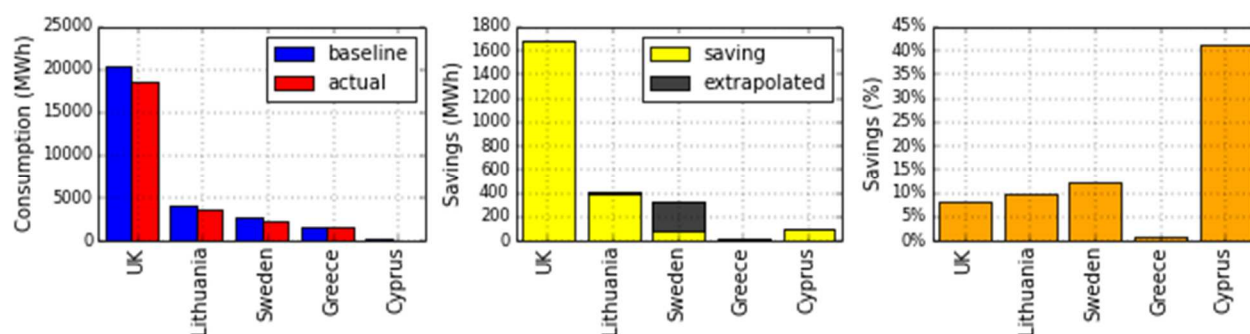
3.2 Country specific savings

Overall percentage and kilowatt hour savings were calculated for each of the five participating countries, in addition to carbon dioxide savings. Table 5 shows per country savings. It is important to note that each dormitory is a different size, therefore some had much bigger absolute energy 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 energy savings (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 energy savings due to small sizes of dormitories, yet their carbon dioxide savings were high proportionally.

Percentage wise, most energy was saved in Cyprus (41.2%), with the lowest savings reported in Greece (0.9%). UK had the highest absolute energy savings (1,690 MWh), with the lowest reported in Greece (15 MWh). UK also had the highest carbon dioxide savings (908 tonnes CO₂) whereas the lowest was reported in Sweden (8 tonnes CO₂).

Table 5 Country specific kWh, percentage and carbon dioxide savings based on meter readings

	United Kingdom	Sweden	Lithuania	Greece	Cyprus	TOTAL
Baseline (MWh)	20340	2706	4153	1661	244	29104
Usage (MWh)	18650	2377	3739	1646	143	26556
Extrapolated saving (MWh)	5	244	12	0	0	261
Total saving (MWh)	1690	330	413	15	101	2548
% saving	8.3%	12.2%	9.9%	0.9%	41.2%	8.8%
CO ₂ savings (tonnes)	908	6	109	11	73	1094



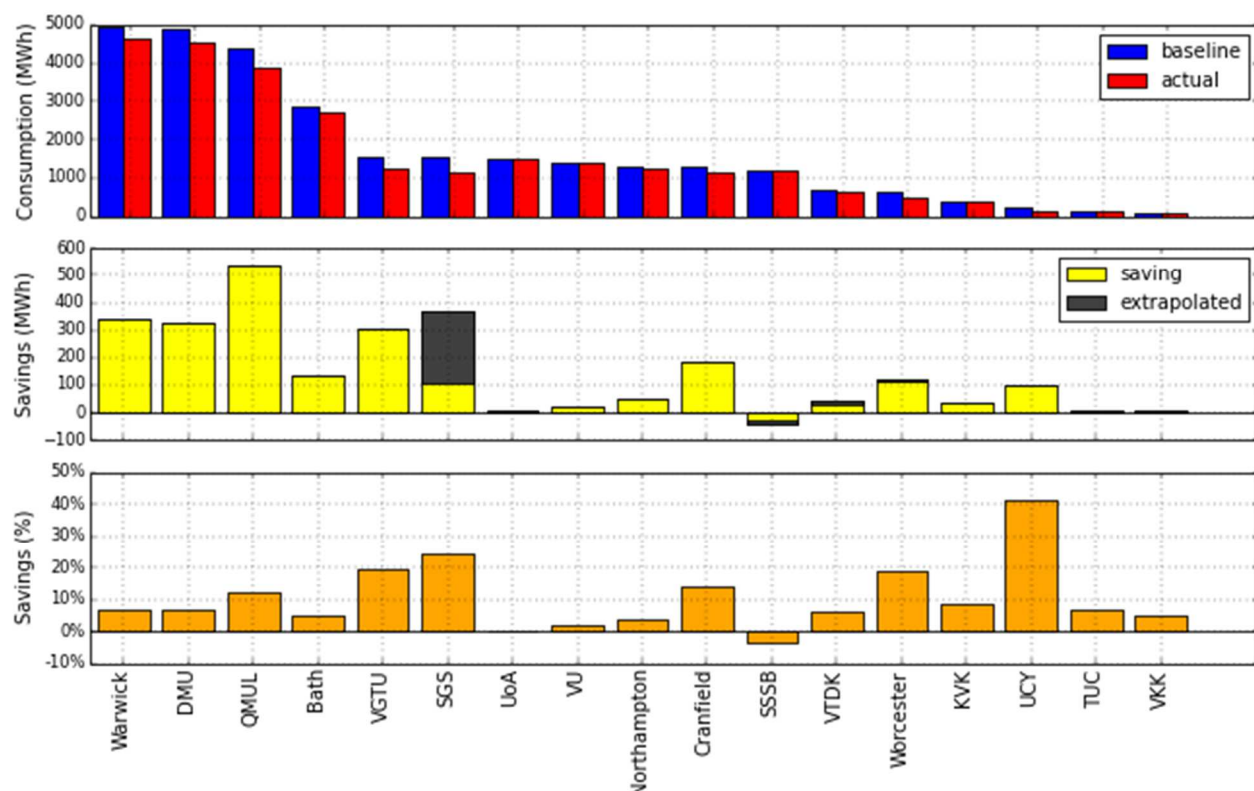
3.3 Dormitory provider specific savings

Detailed energy analysis was performed on energy data of each participating dormitory provider. The results are presented in Table 6. The biggest energy saving can be noted in QMUL (UK), where 539 MWh were saved. The biggest percentage saving has been at UCY (Cyprus) where a 41.2% saving is noted. The most carbon dioxide was saved in QMUL (UK) (293 tonnes CO₂).

Table 6 Dormitory provider specific MWh, percentage and carbon dioxide savings based on meter readings (note figures may not add up due to rounding)

	Baseline	Usage	Extrapolated saving (MWh)	Total saving (MWh)	Energy Saving (%)	CO ₂ saving (tonnes)
QMUL	4404	3865	3	539	12.2%	289
Bath	2856	2720	0	135	4.7%	73
Cranfield	1314	1132	0	182	13.8%	98
Warwick	4961	4618	0	342	6.9%	184
Worcester	622	504	2	118	19.0%	64
Northampton	1317	1270	0	47	3.6%	25
DMU	4866	4541	0	325	6.7%	175
Athens	1502	1497	0	5	0.3%	3
TUC	159	149	0	10	6.5%	7
Cyprus	244	143	0	101	41.2%	74
SSSB	1177	1217	-15	-39	-3.3%	-1
SGS	1529	1160	259	369	24.1%	6
VU	1406	1382	3	24	1.7%	6
VG TU	1567	1260	0	307	19.6%	83
VTDK	672	631	9	41	6.1%	9
VKK	94	89	0	5	5.1%	1

KVK	413	377	0	36	8.8%	10
Total	29104	2655624934	261	2548	8.8%	1107



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 7). 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 1% savings, whereas the treatment group had 12.27% savings.

Table 7 MWh, percentage and carbon dioxide savings in the control and treatment groups

	Control group	Treatment group (with adjustment)
BASELINE (MWh)	3332	2706
Usage (MWh)	3292	2377
Reduction (MWh)	39	330
% change	1.2%	12.2%
CO₂ savings (tonnes)	1	6

In conclusion, energy consumption in 2015-2016 was reduced by 2548MWh below baseline levels. This is an 8.8%Carbon emissions reductions were 1,107 tonnes. This high level of reduction is due to the majority of savings being made in the UK where carbon intensity is fairly high.

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 Linköping, Sweden. Only students that responded 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. It was not possible for respondents that did not provide this information to be included in this analysis.

The total number of responses for the follow-up survey was 821. From those 821 responses 745 were matched to respondents of the baseline survey and were therefore used in the analysis presented in this report (Table 12). The number of **matched respondents** meets the target of 15% of 15% of the number of students participating in SAVES ($0.15 \times 0.15 \times 31803 = 715$).

Table 8 Survey response rate

	Cyprus	Greece	Lithuania	Sweden	UK	Sweden CG	Total
Students participating in SAVES (count)	208	1142	7171	3644	17705	2406	32276
Target responses for follow-up survey (count)	5	26	161	82	398	54	726
Respondents <u>matched</u> with baseline survey (count)	15	18	134	185	266	127	745

Respondents live in dormitories in five different countries (Table 9)

Table 9). Respondents from seventeen dormitory providers took the survey. Seven of these are in the UK, five in Lithuania, three in Sweden, two in Greece and 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 9 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 Klaipėdos valstybinė kolegija Vilniaus technologijų 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

4.2 Results: Dormitories implementing Student Switch Off

4.2.1 Respondent characteristics

A large number of female, compared to male respondents participated in the survey. Fifty nine percent of the respondents are female and 40% are male. The biggest proportion of female respondents is found in Cyprus and in Lithuania (67% and 66%, respectively). In Greece the same number of male and female students participated in the survey.

Almost half of the respondents (48%) are between 18-20 years of age. However, in Cyprus, Greece and Sweden the proportion of students that are between 21-24 years of age is higher than the proportion of students between 18-20. In Greece and in Sweden a significant number of students is also between 25-29. Lithuania and the UK have the youngest population of respondents with the majority being between 18-20 years of age.

The majority of respondents are native to the country they study in (64% of total). In 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 (20% and 28%, respectively), while in Cyprus, Greece and Lithuania no international non-EU students are met.

Table 10 Respondent demographics (follow-up survey)

	Cyprus	Greece	Lithuania	Sweden	UK		Total
Gender							
Male	27%	50%	34%	43%	39%		40%
Female	67%	50%	66%	54%	60%		59%
Other	0%	0%	0%	1%	0%		0%
Prefer not to say	7%	0%	0%	2%	0%		1%
Age							
<17	0%	0%	0%	0%	2%		1%
18-20	40%	33%	57%	14%	68%		48%
21-24	47%	44%	40%	44%	21%		33%
25-29	7%	17%	2%	32%	6%		14%
>=30	0%	6%	0%	9%	2%		4%
prefer not to say	7%	0%	0%	1%	0%		1%
Citizenship							
Native	73%	94%	100%	43%	57%		64%
EU citizen	27%	6%	0%	29%	23%		19%
non-EU citizen	0%	0%	0%	28%	20%		17%
Year of study							
1st Year University	27%	17%	37%	5%	70%		41%
2nd Year University	13%	11%	22%	19%	1%		12%
>2nd Year University	40%	39%	31%	29%	5%		19%
PGr - Masters	13%	33%	10%	31%	20%		21%
PGr - Doctorate	7%	0%	0%	11%	2%		5%

Other	0%	0%	0%	4%	3%		2%
Subject of studies							
Architecture / Engineering / Technology	13%	22%	49%	39%	23%		33%
Arts / Humanities	20%	11%	8%	10%	20%		14%
Health Sciences / Medicine	0%	6%	9%	18%	13%		13%
Mathematics / Physical Sciences	27%	33%	11%	6%	18%		14%
Social Sciences	40%	28%	23%	26%	26%		26%
Living in dorms status							
First year in specific dorm providers dorms	27%	33%	40%	41%	93%		63%
Lived in specific dorm providers dorms in the previous academic year	73%	67%	60%	59%	7%		37%

The majority of respondents (72%) are undergraduates, while 26% are postgraduates. The proportion of first year students in the UK is really high (70%) while in Sweden it is significantly low (5%). However, Sweden has the biggest percentage of post-graduate students (42%). Two percent of total respondents selected the "other" option. These students are mainly exchange students (Erasmus or international), top-up students or research associates and study in Sweden and the UK.

Respondents study all main subjects of study. Overall, the biggest percentage of respondents (33% of total) study architecture, engineering or technology and are assumed to have the best level of knowledge or awareness of energy saving issues. In Lithuania, the number of students studying architecture, engineering or technology is high (49%). In Cyprus this number is rather low (13% of respondents). In the remaining countries this percentage varies between 22% (Greece) and 39% (Sweden). The second most represented subject of study (26% of respondents) is social sciences. Arts/Humanities, Health sciences/medicine and mathematics/physical sciences are each studied by 13-14% of respondents.

Almost one third of the respondents lived in dorms of their current dormitory provider/university the previous academic year. At country level this is mostly the case for Cyprus (73%), Greece (67%), Lithuania (60%) and Sweden (59%). These residents are more likely to have heard of or been involved in Student Switch Off the previous year. For 93% of the respondents in the UK this is the first year that the students are living in dorms of their current dormitory provider/university.

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.

As shown in Figure 2 65% of respondents will be doing more to save energy when they move out of dorms. Another 32% of respondents say think that they will be doing about the same as they are doing this year. Only 1% will be doing less to save energy.

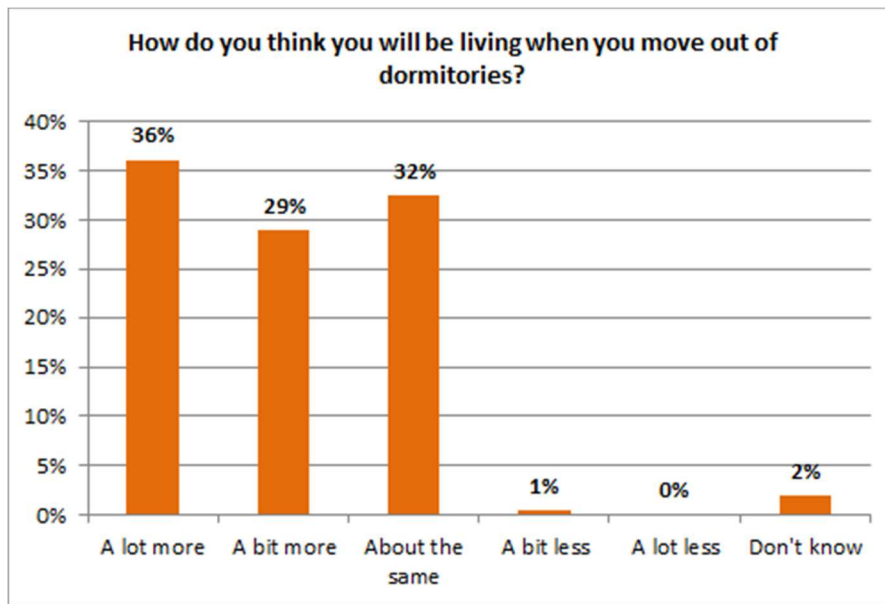


Figure 2 Opinion about energy saving efforts in future lifestyle (total sample)

As shown in Table 11 in all countries except for Sweden the largest proportion of students will be doing a lot more to save energy when they move out of dorms. In Sweden the biggest proportion of students (48% of respondents) will be doing about the same. Only a very small proportion in Lithuania and Sweden (2% and 1%, respectively) think that they will be doing less.

Table 11 Energy saving efforts in future lifestyle (per country)

How do you think you will be living when you move out of dormitories?						
Country	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
Cyprus	40%	27%	27%	0%	0%	7%
Greece	43%	21%	36%	0%	0%	0%
Lithuania	48%	32%	15%	2%	0%	4%
Sweden	29%	22%	48%	1%	0%	0%
UK	35%	33%	30%	0%	0%	2%
Total	36%	29%	32%	1%	0%	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 significant ($t(616)=3.494$, $p=.001$) and are towards a decrease in the level of information on what respondents personally consume in their dormitory (8% decrease in the mean value overall).

A decrease is observed in all countries except for Sweden (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 received building level energy consumption information through the dashboard and not room level energy consumption information.

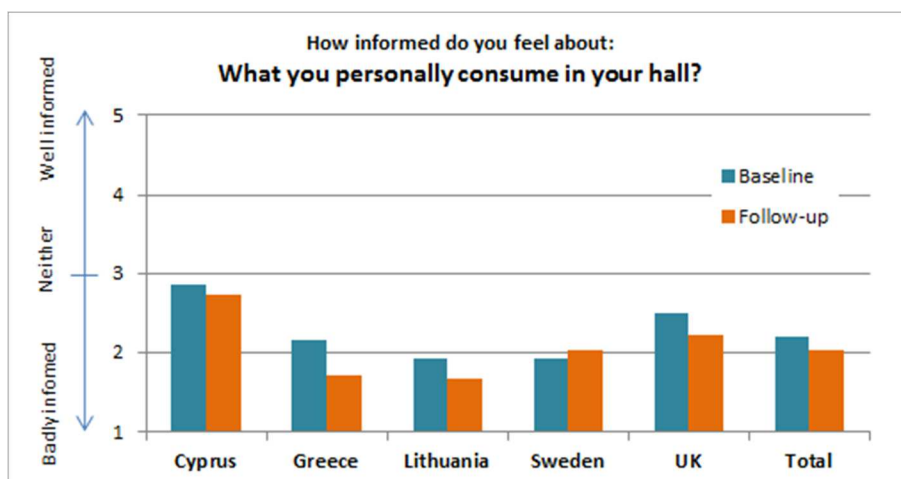


Figure 3 Mean values for perceived level of information on personal energy use (total sample and per country)

At the end of the academic year the highest level of knowledge on what respondents personally consume in their dormitory is found in Cyprus (2.7 ± 1.03) and the lowest in Greece and Lithuania (1.7 ± 1.27 and $1.7 \pm .86$, respectively). The biggest reduction in the level of information on what respondents personally consume in their dormitory is met in Greece (21% reduction). In the remaining countries this reduction ranges between 5% (Cyprus) and 13% (Lithuania). In Sweden there has been a 5% increase in the level of knowledge on what respondents personally consume in their dormitory. Paired samples t-test shows that the decrease in the level of knowledge is statistically significant in Lithuania ($t(133)=2.717$, $p=.007$) and in the UK ($t(264)=4.036$, $p<.001$).

Table 12 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	2,9	,99	2,7	1,03	-0,13	-5%
Greece	2,2	1,42	1,7	1,27	-0,44	-21%
Lithuania	1,9	,96	1,7	,86	-0,25*	-13%
Sweden	1,9	1,10	2,0	1,18	0,10	5%
UK	2,5	1,13	2,2	1,15	-0,29*	-12%

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 ($t(616)=-5.315$, $p<.001$). Difference is towards an increase in the level of knowledge of what respondents can do to save energy in their dormitory (increase of 8% in the mean value overall). Such an increase is observed in all individual countries except for Cyprus where an 8% decrease is observed (Figure 4 and Table 17).

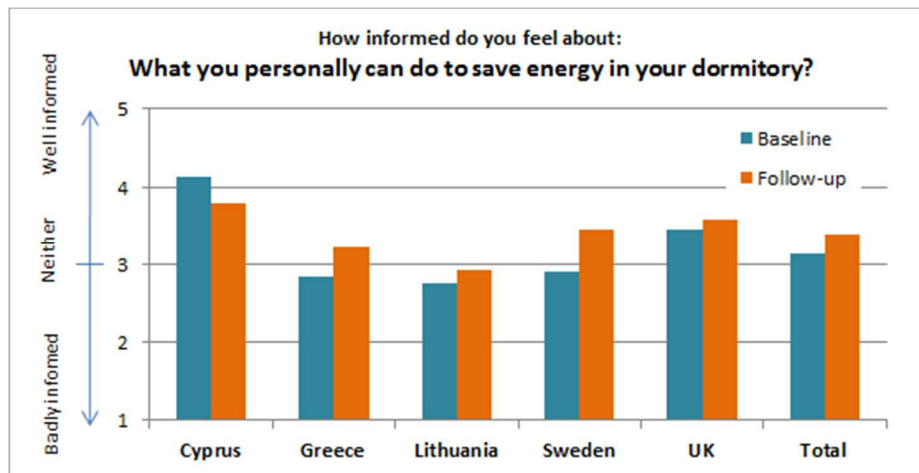


Figure 4 Mean values for perceived level of information on ways to save energy (total sample and per country)

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 (3.8 ± 1.42) and the lowest in Lithuania (2.9 ± 1.01). The biggest increase in the level of information on what respondents can personally do to save energy in their dormitory is found in Sweden (19% increase). In the remaining countries this increase ranges between 4% (UK) and 14% (Greece).

Paired samples t-test shows a statistically significant increase in the level of information in Sweden ($t(184) = -6.186$, $p < .001$) and a marginally significant increase in the UK ($t(264) = -1.862$, $p = .064$).

Table 13 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	4,1	,74	3,8	1,42	-0,33	-8%
Greece	2,8	1,20	3,2	1,35	0,39	14%
Lithuania	2,8	,95	2,9	1,01	0,16	6%
Sweden	2,9	1,19	3,4	1,03	0,54*	19%
UK	3,5	1,03	3,6	,95	0,12*	4%

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). The lower the mean value the greater the increase in energy awareness.

Overall, the energy awareness of respondents has increased by "a little" (3.2 ± 1.21).

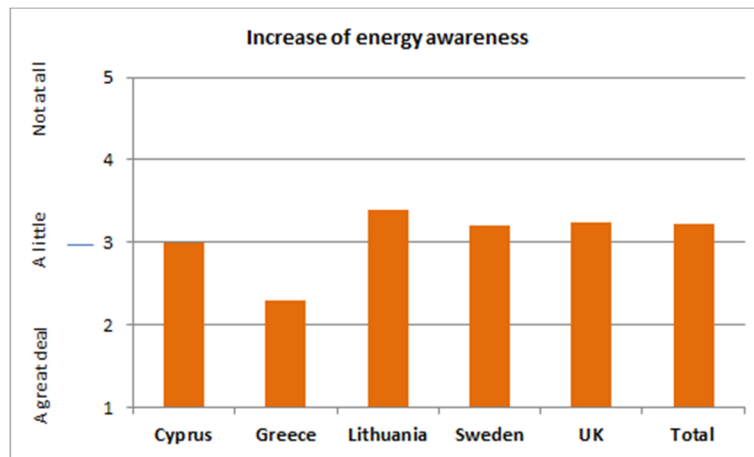


Figure 5 Mean values for increase in awareness of impacts (total sample and per country)

The biggest increase in energy awareness is reported from Greece ("Quite a bit"). In Lithuania the smallest increase is found ("A little") which could be related to the fact that in Lithuania the highest percentage of students that study architecture, engineering or technology is found (Table 10) and are assumed to already have a good level of knowledge or awareness of energy saving issues.

Table 14 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
3,0	1,13	2,3	,91	3,4	1,13	3,2	1,26	3,2	1,21	3,2	1,21

4.2.4.2 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.

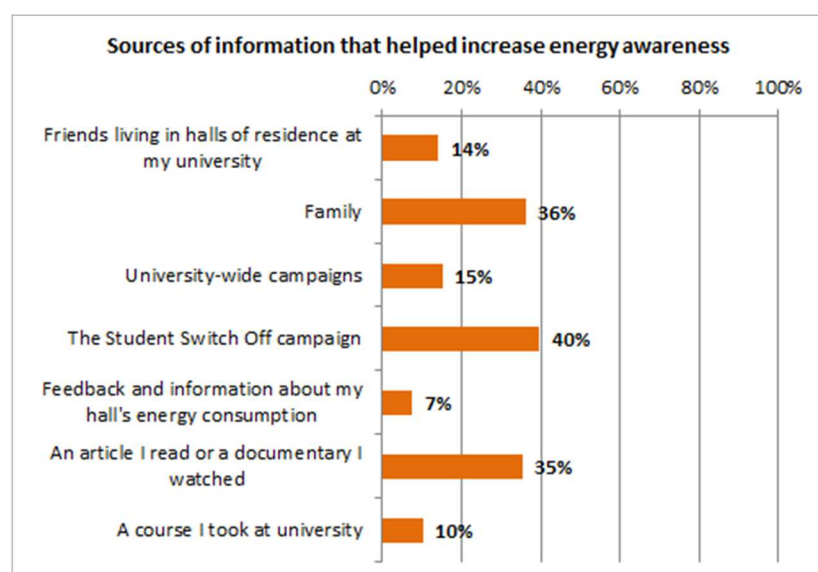


Figure 6 Main sources of information that have contributed to the increase of energy awareness (total sample)

As shown in Figure 6 the top three sources of information that helped the most in increasing the energy awareness of respondents are: the Student Switch Off campaign (40% of respondents); family (36% of respondents) and; an article they have read or a documentary they watched (35% of respondents). The least influential sources of information are: feedback and information on their dormitory's energy consumption (7%); university courses (10%) and; friends living in dormitory (14%).

Student Switch Off receives a high number of votes and is in the top three most influential sources of information in all countries (Table 15).

Table 15 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
Friends living in dormitories at my university	7%	29%	18%	20%	14%
Family	47%	21%	49%	48%	38%
University-wide campaigns	27%	29%	8%	15%	24%
The Student Switch Off campaign	40%	71%	36%	40%	58%
Feedback and information about my dormitory's energy consumption	7%	14%	4%	6%	13%
An article I read or a documentary I watched	53%	71%	53%	49%	30%
A course I took at university	27%	29%	14%	20%	4%

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). The higher the mean value the higher the frequency that the action is performed.

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.

Compared to the beginning of the academic year an increase is observed in the frequency that the less known energy saving actions are performed, namely putting a lid on pans when cooking and boiling only the right amount of water (Table 16). The change is statistically significant for putting a lid on pans when cooking ($t(439)=-2.185, p<.05$) and somewhat significant for boiling only the right amount of water in the kettle ($t(440)=-1.867, p<.063$). For the better known energy saving actions of switching off lights in empty rooms and avoiding leaving electronic equipment on stand-by a small decrease in the frequency that they are performed is observed which nonetheless is not statistically significant ($(t(440)=1.301, p=.194)$ and $(t(439)=.884, p=.377)$, respectively). Putting an extra layer on before using heating and opening windows for cooling did not have a major change ($(t(440)=.251, p=.802)$ and $(t(440)=.202, p=.840)$, respectively).

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 $4.52\pm.66$ and $4.58\pm.79$, respectively).

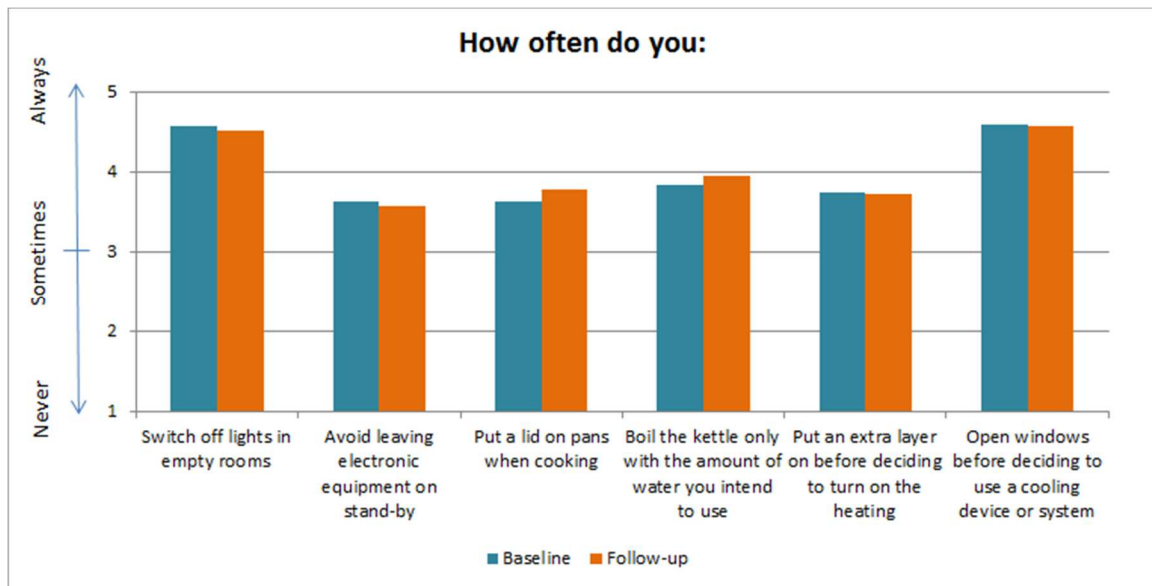


Figure 7 Mean values for frequency in which energy saving actions are performed (total sample)

Paired samples t-test was performed for each country 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 a lid is put on pans when cooking ($t(12)=-2.501, p<.05$).

In Greece a significant increase is observed in the frequency that the right amount is boiled with the kettle ($t(7)=-2.376, p<.05$) while a significant decrease is observed in the frequency that extra layers are put on instead of the heating ($t(7)=3.416, p<.05$).

In Lithuania a significant increase is observed in the frequency that the right amount is boiled with the kettle ($t(70)=2.706, p<.05$).

In Sweden a significant increase is observed in the frequency that a lid is put on pans when cooking ($t(141)=-2.290, p<.05$).

In the UK a significant increase is observed in the frequency that the right amount is boiled with the kettle ($t(206)=-2.181, p<.05$).

The action performed the most often in Cyprus, Greece and Sweden is that of switching off lights in empty rooms ($4.69\pm.48, 4.50\pm1.24$ and $4.57\pm.60$, respectively). In Lithuania and the UK the action performed most frequently is that of opening windows for cooling ($4.70\pm.68$ and 4.64 ± 0.73 , respectively).

The least performed action in Cyprus and in the UK is that of putting a lid on pans (3.46 ± 0.88 and 3.42 ± 1.19 , respectively). In Greece and Lithuania avoiding leaving electronic equipment on stand-by is the least performed action (3.38 ± 1.13 and $3.73\pm.87$). In Sweden the action performed least often is that of putting an extra layer on instead of the heating (3.61 ± 1.20). Still, all actions are performed more often than "sometimes" (all mean values are greater than 3).

Table 16 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	4,69	,48	4,62	,51	-0,1	-2%
Greece	4,50	1,24	4,50	,52	0,0	0%
Lithuania	4,56	,84	4,38	,92	-0,2	-4%

Sweden	4,57	,60	4,55	,58	0,0	0%
UK	4,57	,59	4,55	,62	0,0	0%
Total	4,57	,64	4,52	,66	0,0	-1%
	Baseline		Follow-up		Change in mean value	% Change in mean value
	mean	SD	mean	SD		
Avoid leaving electronic equipment on stand-by						
Cyprus	3,85	,90	4,08	,76	0,2	6%
Greece	3,38	1,13	3,63	,72	0,3	7%
Lithuania	3,73	,87	3,64	1,05	-0,1	-2%
Sweden	3,61	1,17	3,49	1,10	-0,1	-3%
UK	3,59	1,11	3,55	1,13	0,0	-1%
Total	3,62	1,09	3,56	1,09	-0,1	-2%
	Baseline		Follow-up		Change in mean value	% Change in mean value
	mean	SD	mean	SD		
Put a lid on pans when cooking						
Cyprus	3,46	,88	4,00	,71	0,5	16%*
Greece	4,00	1,47	4,38	,65	0,4	9%
Lithuania	4,20	,97	4,20	,88	0,0	0%
Sweden	3,65	1,23	3,85	1,04	0,2	5%*
UK	3,42	1,19	3,54	1,14	0,1	3%
Total	3,63	1,18	3,77	1,08	0,1	4%*
	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	3,85	,90	4,38	,65	0,5	14%
Greece	3,75	1,24	4,38	,87	0,6	17%*
Lithuania	3,99	,84	3,68	1,08	-0,3	-8%*
Sweden	3,91	1,10	4,01	,96	0,1	3%
UK	3,74	1,16	3,97	1,04	0,2	6%*
Total	3,84	1,08	3,95	1,01	0,1	3%*
	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	,91	3,85	,69	-0,2	-4%
Greece	4,25	1,06	3,63	1,00	-0,6	-15%*
Lithuania	3,77	1,04	3,66	1,15	-0,1	-3%
Sweden	3,61	1,20	3,59	1,21	0,0	-1%
UK	3,78	1,12	3,84	1,13	0,1	1%
Total	3,74	1,12	3,73	1,15	0,0	0%
	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	4,08	,95	4,00	,58	-0,1	-2%
Greece	4,25	1,38	4,50	,78	0,3	6%
Lithuania	4,70	,68	4,77	,48	0,1	1%
Sweden	4,51	,86	4,44	1,00	-0,1	-1%
UK	4,64	,73	4,64	,70	0,0	0%
Total	4,59	,78	4,58	,79	0,0	0%

*: statistically significant change ($p < .05$)

4.2.6 Behavioural antecedents

Overall, seven items from seven 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 some differences are found in the mean values. Differences can be observed in Figure 8 and in Table 21. Paired samples t-test was used to determine whether the differences between the baseline and follow-up survey are statistically significant.

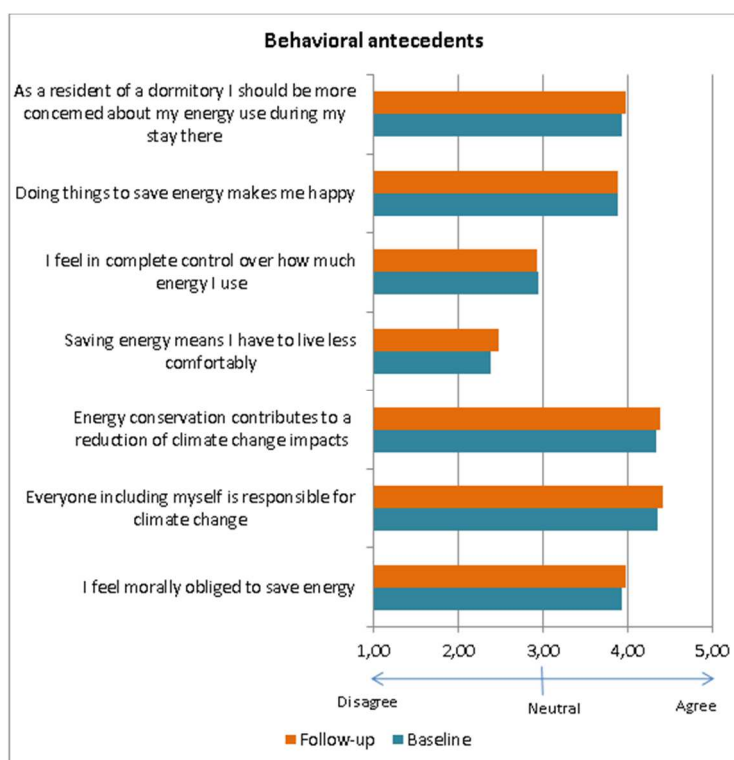


Figure 8 Mean values for behavioural antecedents (total sample)

Statistically significant changes are observed for one out of seven studied items therefore no single theory or model is verified with change in all its relevant variables. The item with the statistically significant change is the attitude that says “saving energy means I have to live less comfortably” ($t(429) = -2.063$, $p < .05$). The change in this item has a negative meaning as it implies an increase in the level that respondents think that saving energy means they have to live less comfortably. In emotions no change is found. In all other items a change with a positive meaning is observed.

Table 17 Mean values and standard deviations for personal norms items (total sample)

		Baseline		Follow-up		Change in mean value
Personal norms		M	SD	M	SD	
PN-1	I feel morally obliged to save energy	3,93	,94	3,97	,90	0,04
Ascription of responsibility		M	SD	M	SD	change
AR-2	Everyone including myself is responsible for climate change	4,35	,85	4,41	,78	0,06

Awareness of consequences		M	SD	M	SD	change
AC-1	Energy conservation contributes to a reduction of climate change impacts	4,34	,81	4,39	,77	0,05
Attitude		M	SD	M	SD	change
ATT-2	Saving energy means I have to live less comfortably	2,38	,98	2,47	,98	0,09*
Perceived behavioral control		M	SD	M	SD	change
PBC-2	I feel in complete control over how much energy I use	2,95	1,00	2,93	1,03	-0,02
Emotions		M	SD	M	SD	change
EMO-1	Doing things to save energy makes me happy	3,89	,80	3,89	,79	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	3,93	,94	3,97	,90	0,04

*: statistically significant change

Personal norms

Personal norms were measured with one item. A statistically significant change is observed in Greece ($t(6)=-2.500$, $p<.05$). 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 18 Mean values and standard deviations for personal norms items (per country)

I feel morally obliged to save energy					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Cyprus	4,38	,65	4,46	,52	0,08
Greece	3,43	1,13	4,29	1,11	0,86*
Lithuania	3,85	,90	3,73	,94	-0,11
Sweden	4,01	,98	4,11	,84	0,09
UK	3,89	,92	3,92	,92	0,03

*: statistically significant change

Ascription of responsibility

Ascription of responsibility was measured with one item. A statistically significant change is observed in Greece ($t(7)=-3.286$, $p<.05$) and in Sweden ($t(141)=-2.580$, $p<.05$). The increase in the mean value at the end of the academic year shows an increase in ascription of responsibility for climate change.

Table 19 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	4,15	,80	4,38	,87	0,23
Greece	3,57	1,27	4,43	,98	0,86*
Lithuania	4,55	,65	4,55	,69	0,00
Sweden	4,40	,91	4,57	,62	0,17*
UK	4,40	,91	4,57	,62	0,17

*: statistically significant change

Awareness of consequences

Awareness of consequences was measured with one item. A somewhat statistically significant change is observed in Sweden ($t(141)=-1.911, p=.058$). The increase in the mean value at the end of the academic year is indicative of an increase in awareness of energy consumption contribution to climate change.

Table 20 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 mean value
	M	SD	M	SD	
Cyprus	4,46	,66	4,54	,52	0,08
Greece	4,57	,79	4,86	,38	0,29
Lithuania	4,46	,79	4,44	,71	-0,03
Sweden	4,39	,84	4,54	,73	0,15*
UK	4,24	,81	4,24	,81	-0,01

*: statistically significant change

Attitudes

Attitudes were measured through two items. A statistically significant change is observed in the UK ($t(196)=-2.156, p<.05$). This change is towards an increase of the level that respondents think that saving energy means they have to live less comfortably.

Table 21 Mean values and standard deviations for attitudes items (per country)

Saving energy means I have to live less comfortably					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Cyprus	2,46	,66	2,38	,77	-0,08
Greece	2,43	,79	1,86	1,07	-0,57
Lithuania	2,27	,88	2,32	,92	0,06
Sweden	2,46	,96	2,56	,96	0,10
UK	2,37	1,06	2,49	1,03	0,13*

*: statistically significant change

Perceived behavioural control

Perceived behavioural control was measured through one item. No statistically significant change is observed in any of the countries.

Table 22 Mean values and standard deviations for perceived behavioural control items (per country)

I feel in complete control over how much energy I use					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Cyprus	3,38	,77	3,23	,93	-0,15
Greece	3,14	1,35	3,43	1,27	0,29
Lithuania	3,00	,91	2,93	,99	-0,07
Sweden	2,75	1,02	2,82	1,03	0,08
UK	3,05	1,00	2,98	1,05	-0,07

*: statistically significant change

Emotions

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

Table 23 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	4,15	,69	4,38	,65	0,23
Greece	4,14	,38	4,43	,53	0,29
Lithuania	3,97	,79	3,85	,80	-0,13
Sweden	3,93	,77	3,91	,78	-0,02
UK	3,80	,84	3,84	,79	0,05

*: statistically significant change

Role beliefs

Role beliefs were measured through one item. A significant change is observed in Greece ($t(7)=-3.286$, $p<.05$) towards an increase in the role belief that as residents of dormitories respondents should be more concerned about their energy use there. In Lithuania a somewhat significant change ($t(70)=1.891$, $p=.063$) is observed towards the opposite direction.

Table 24 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	3,77	,83	3,85	,69	0,08
Greece	3,57	,53	4,29	,76	0,71*
Lithuania	3,83	,74	3,65	,90	-0,18*
Sweden	3,35	,99	3,28	1,07	-0,06
UK	3,46	,92	3,46	,95	0,00

*: 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 helps reduce global warming is also very high in the list. The same order of importance is also found for the baseline survey. Others asking students 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.

The changes between the baseline and the follow-up do not exceed 2% for all items. A 2% increase is observed in the follow-up survey for "it's the right thing to do" and "I don't know why, I just do it". A 2% decrease is observed in "it saves energy" and "it makes me feel good about myself". For all other items the change was between 0% and 1%.

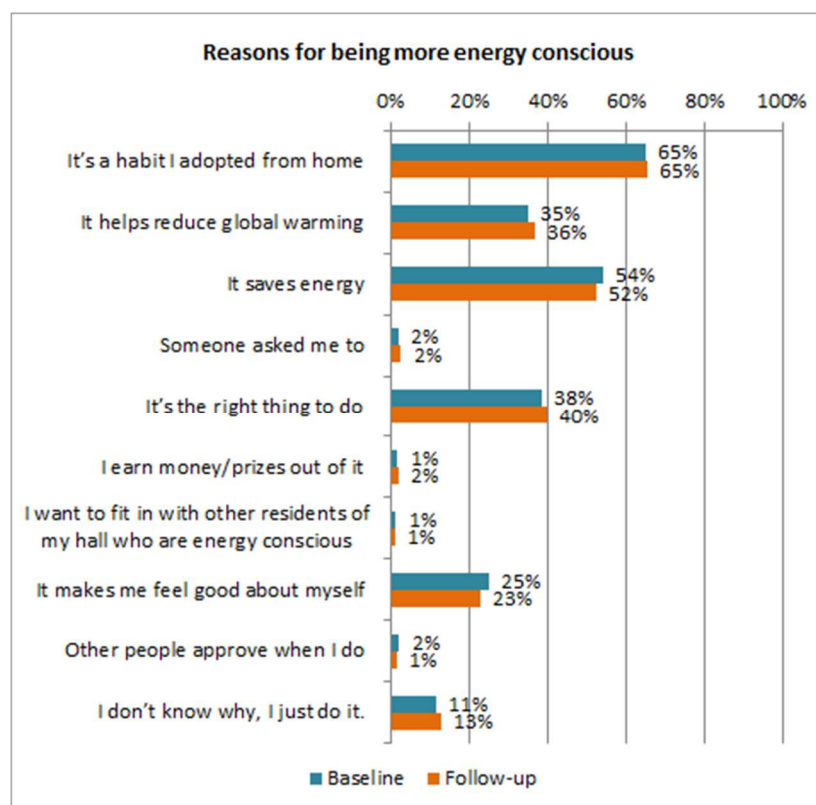


Figure 9 Reasons for being more energy conscious (total sample)

In all countries "it's a habit I adopted from home" is in the top three reasons in all countries. In Cyprus, Lithuania, Sweden and the UK "it saves energy" is also in the top three reasons. In Greece "it helps reduce global warming" is more popular instead. In Lithuania, Sweden and the UK "it's the right thing to do" is the third most important reason for being more energy conscious. In Cyprus and Greece the third most important reason is "it makes me feel me good about myself".

Between the baseline and follow-up survey there is no change in the items in the top three list except for one item in Greece. In the baseline survey "it saves energy" was in the top three reasons. In the follow-up survey this changed to "it helps reduce global warming".

In Cyprus and Greece significant changes are observed in a number of items. This is mainly attributed to the small sample size rather than a more significant change compared to the other countries. In Cyprus a significant decrease is observed in the number of students that consider "it's the right thing to do" as an important reason for being more energy conscious, while a significant increase is observed in the number of students that selected "it helps reduce global warming" in the follow-up survey. In Greece the biggest increase is found for "it helps reduce global warming", while the biggest decrease is found in "it saves energy". In Lithuania the most significant decrease is found in "it saves energy" while a significant increase is found in those saying that "I don't know, I just do it". In Sweden and the UK changes are rather small; between 0% and 4% for Sweden, while in the UK the change does not exceed 2% for any of the listed items.

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 25 Reasons for being more energy conscious (per country)

Reason for being more energy conscious	Cyprus	Greece	Lithuania	Sweden	UK	Total
follow-up	80%	71%	85%	74%	79%	65%

It's a habit I adopted from home	difference from baseline	-7%	10%	1%	-3%	3%	0%
It helps reduce global warming	follow-up	67%	86%	39%	44%	42%	36%
	difference from baseline	33%	52%	2%	2%	-3%	2%
It saves energy	follow-up	80%	43%	57%	68%	63%	52%
	difference from baseline	27%	-18%	-9%	5%	-4%	-2%
Someone asked me to	follow-up	0%	0%	4%	2%	3%	2%
	difference from baseline	0%	0%	1%	0%	1%	1%
It's the right thing to do	follow-up	0%	21%	40%	55%	51%	40%
	difference from baseline	-40%	-1%	-1%	7%	2%	2%
I earn money/prizes out of it	follow-up	0%	0%	3%	1%	2%	2%
	difference from baseline	0%	-6%	3%	-1%	0%	0%
I want to fit in with other residents of the dormitory who are energy conscious	follow-up	0%	0%	1%	0%	2%	1%
	difference from baseline	0%	0%	-1%	-1%	0%	0%
It makes me feel good about myself	follow-up	73%	64%	33%	23%	22%	23%
	difference from baseline	-13%	14%	-3%	-4%	-2%	-2%
Other people approve when I do	follow-up	0%	0%	3%	1%	1%	1%
	difference from baseline	0%	-6%	-1%	0%	-1%	-1%
I don't know why, I just do it.	follow-up	0%	7%	22%	14%	14%	13%
	difference from baseline	0%	-4%	8%	1%	-1%	1%

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 most important reasons for not being as energy conscious 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 were the most popular in the baseline period as well. For all three a significant increase in the proportion of respondents that selected them is found (between 4% and 5%).

Overall, the attitude that sustainable living is not for them and fear that others will make fun of them are not important reasons for being less energy conscious among the respondents.

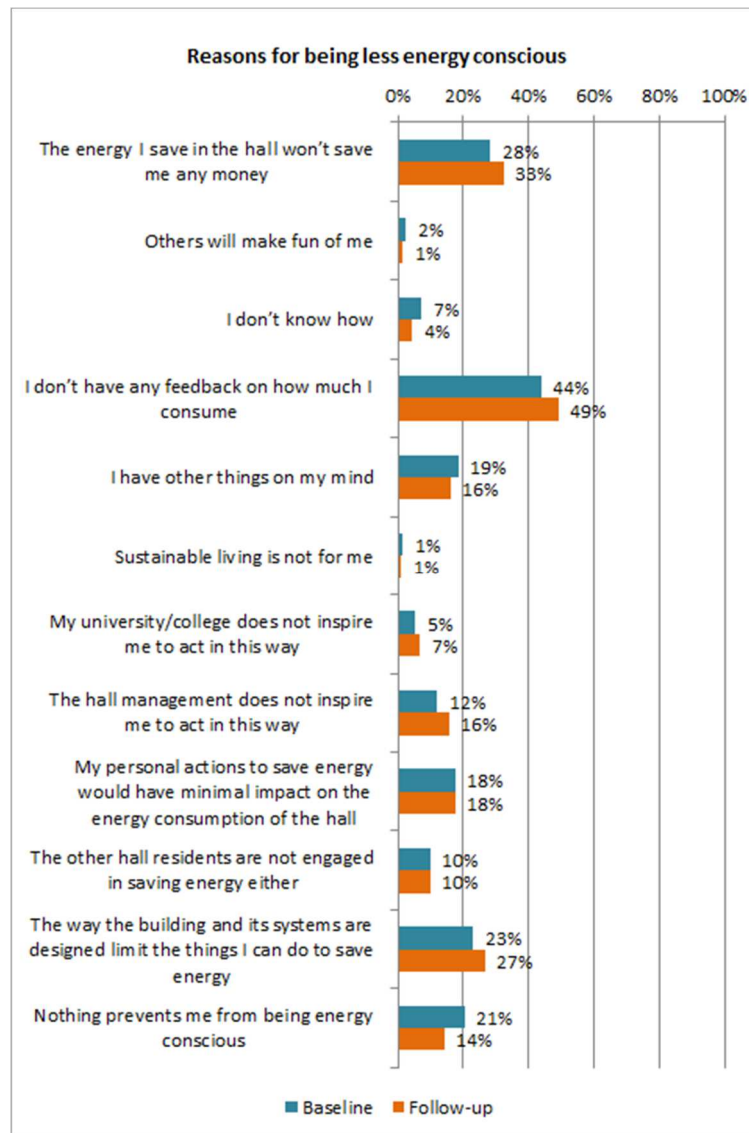


Figure 10 Reasons for being less energy conscious (total sample)

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 is in the top three reasons in all countries. Building structure and systems is in the top three reasons for all countries except for Lithuania.

A difference in the ranking of top reasons is also found between the baseline and follow-up in individual countries. However, lack of energy consumption feedback was in the top three reasons for being less energy conscious in the baseline survey in all countries as well. It is also worth mentioning that in the baseline survey limitations in the building structure and its systems was not in the top three reasons for all countries except for Sweden.

Table 26 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	0%	7%	38%	39%	44%	33%
	difference from baseline	-20%	-10%	8%	9%	3%	4%
Others will make fun of me	follow-up	7%	0%	0%	3%	1%	1%
	difference from baseline	0%	-11%	-1%	1%	-2%	-1%
I don't know how	follow-up	7%	21%	0%	8%	5%	4%

	difference from baseline	7%	10%	-2%	-5%	-4%	-3%
I don't have any feedback on how much I consume	follow-up	47%	71%	62%	64%	55%	49%
	difference from baseline	7%	27%	8%	10%	1%	5%
I have other things on my mind	follow-up	13%	14%	12%	22%	23%	16%
	difference from baseline	7%	-8%	5%	-1%	-8%	-2%
Sustainable living is not for me	follow-up	0%	0%	1%	1%	2%	1%
	difference from baseline	0%	-11%	0%	-1%	0%	0%
My university/college does not inspire me to act in this way	follow-up	0%	21%	20%	3%	6%	7%
	difference from baseline	-7%	5%	9%	-2%	2%	2%
The dormitory management does not inspire me to act in this way	follow-up	0%	14%	48%	13%	9%	16%
	difference from baseline	0%	-19%	11%	1%	5%	4%
My personal actions to save energy would have minimal impact on the energy consumption of the dormitory	follow-up	20%	21%	15%	17%	28%	18%
	difference from baseline	-7%	-12%	-1%	0%	2%	0%
The other dormitory residents are not engaged in saving energy either	follow-up	20%	0%	10%	12%	13%	10%
	difference from baseline	-7%	-11%	5%	3%	-3%	0%
The way the building and its systems are designed limit the things I can do to save energy	follow-up	33%	86%	20%	30%	37%	27%
	difference from baseline	13%	41%	-11%	4%	10%	4%
Nothing prevents me from being energy conscious	follow-up	40%	0%	19%	17%	15%	14%
	difference from baseline	-7%	-6%	-16%	-12%	-1%	-6%

4.3 Results: Comparison with control group

In the first year of the SSO implementation at EU level a control group from Linköping, Sweden was recruited. The treatment group is comprised of the Swedish dormitories (Stockholm and Gothenburg) participating in SAVES. One hundred and thirty five valid responses for the follow-up survey were collected from occupants of the control group buildings and 208 from the treatment group buildings. From those responses, 127 respondents from the control group and 185 from the treatment were matched to the baseline survey through their names or emails (Table 13Table 8). 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. The control group has the same number of female respondents as male respondents in the treatment group and the same number of male respondents as female respondents in the treatment group. Differences found in gender between the groups are not statistically significant ($\chi^2(3)=4.053$, $p=.256$).

Significant differences are found in the age groups that participated in the survey between the two groups ($\chi^2(4)=17.678$, $p=.001$). The biggest proportion of students in both groups is between 21-24 years of

age. The population of the control group is “younger” than the population of the treatment group with a higher proportion of students between 18-24 years. The treatment group has a higher proportion of students of >25 years.

Significant differences in the origin of students are also found between the two groups ($\chi^2(2)=21.907$, $p<.001$). The biggest majority (69%) of the respondents of the control group are native to the country they study in while less than half (43%) of the respondents from the treatment group are native. Fifty seven percent of the treatment group respondents are not from Sweden. In the control group, the percentage of non-native respondents is 31%.

Table 27 Respondent demographics (follow-up survey)

		Treatment group	Control group
Gender			
	Male	43%	54%
	Female	54%	43%
	Other	1%	1%
	Prefer not to say	2%	2%
Age			
	<17	0%	0%
	18-20	14%	26%
	21-24	44%	53%
	25-29	32%	18%
	>=30	9%	3%
	prefer not to say	1%	0%
Citizenship			
	Native	43%	69%
	EU citizen	29%	12%
	non-EU citizen	28%	19%
Year of study			
	1st Year University	5%	30%
	2nd Year University	19%	17%
	>2nd Year University	29%	22%
	PGr - Masters	31%	30%
	PGr - Doctorate	11%	0%
	Other	4%	1%
Subject of studies			
	Architecture / Engineering / Technology	39%	53%
	Arts / Humanities	10%	14%
	Health Sciences / Medicine	18%	9%
	Mathematics / Physical Sciences	6%	6%
	Social Sciences	26%	18%

Significant differences are also found in the year of study of the respondents between the two groups ($\chi^2(5)=47.971$, $p<.001$). In the control group the proportion of first year students is much higher than that of the treatment group (30% and 5%, respectively). The two groups have similar proportions of masters students but phd students are only found in the treatment group (11%). Exchange students are also found at a higher percentage in the treatment group (4% in the treatment group, 1% in the control group).

Some differences are also found in the subject of study of the respondents between the two groups ($\chi^2(4)=11.005$, $p=.027$). The biggest percentage of respondents study architecture, engineering or

technology in both groups but in the control group this proportion is much higher (53% for control group, 39% for treatment group). Smaller differences are found between the two groups for the remaining subjects of study; the biggest one is 9% 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.

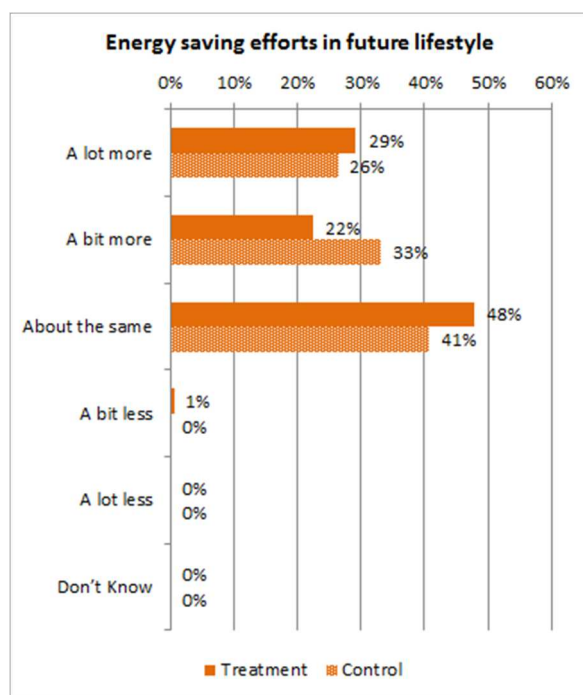


Figure 11 Opinion about energy saving efforts in future lifestyle (treatment and control group)

In both groups the biggest proportion of respondents think that they will be doing about the same to save energy when they move out of dorms (48% for the treatment group and 41% for the control group). The proportion of respondents that will be doing more to save energy is higher in the control group than in the treatment group (51% for the treatment group and 59% for the control group). One per cent of respondents from the treatment group think that they will be doing less to save energy when they move into private accommodation.

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, $t(184)=-1.092$, $p=.276$; control, $t(126)=1.208$, $p=.229$).

The level of knowledge is at similar levels in the two groups and close to "badly informed". In the treatment group a slight increase is observed while for the treatment group a slight decrease is observed in the perceived level of knowledge of what respondents personally consume in their dorms.

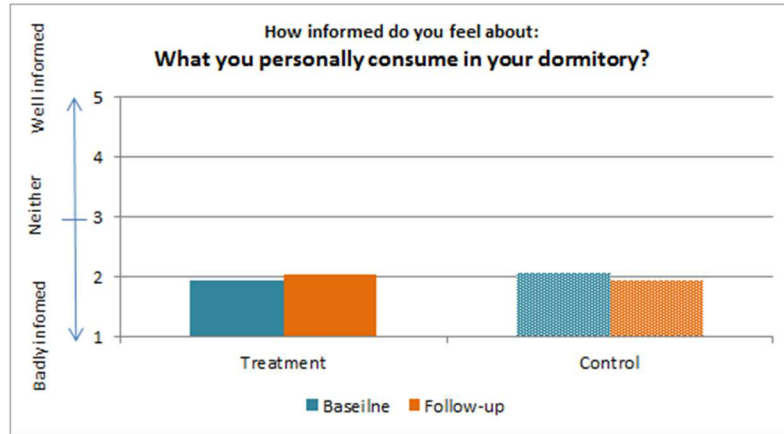


Figure 12 Mean values for perceived level of information on personal energy use (treatment and control group)

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, $t(184)=-6.186$, $p<.001$; control group, $t(126)=-3.296$, $p=.001$).

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

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, 0.54 increase in the mean value; control group, 0.35 increase in the mean value).

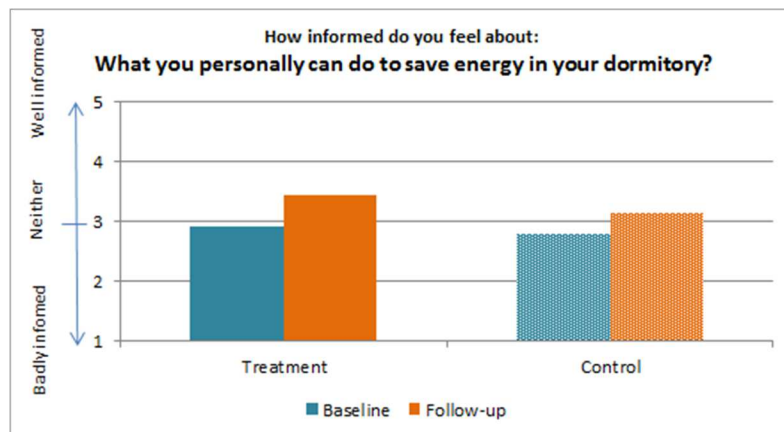


Figure 13 Mean values for perceived level of information on ways to save energy (treatment and control group)

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). The lower the mean value the greater the increase in energy awareness.

Differences between the two groups are not statistically significant ($\chi^2(4)=2.778$, $p=.596$). The increase in the energy awareness in the treatment group is slightly higher in the treatment group.

Table 28 Mean values and standard deviations for increase in awareness of impacts (treatment and control group)

	Mean	SD
Treatment	3,2	1,26
Control	3,4	1,24

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 sources of information that helped increase energy awareness are common in both groups. Those are: an article/documentary and family.

The Student Switch Off campaign is the third most influential source of information for the treatment with 40% of the respondents selecting it. Only 2% of the control group were influenced by Student Switch Off.

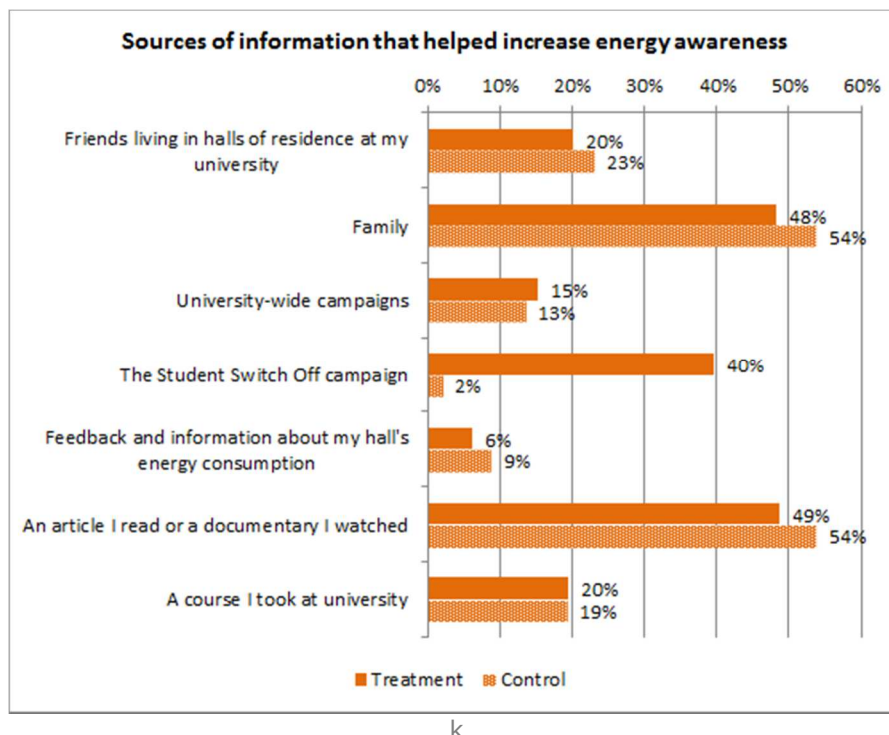


Figure 14 Main sources of information that have contributed to the increase of energy awareness (treatment and control group)

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.

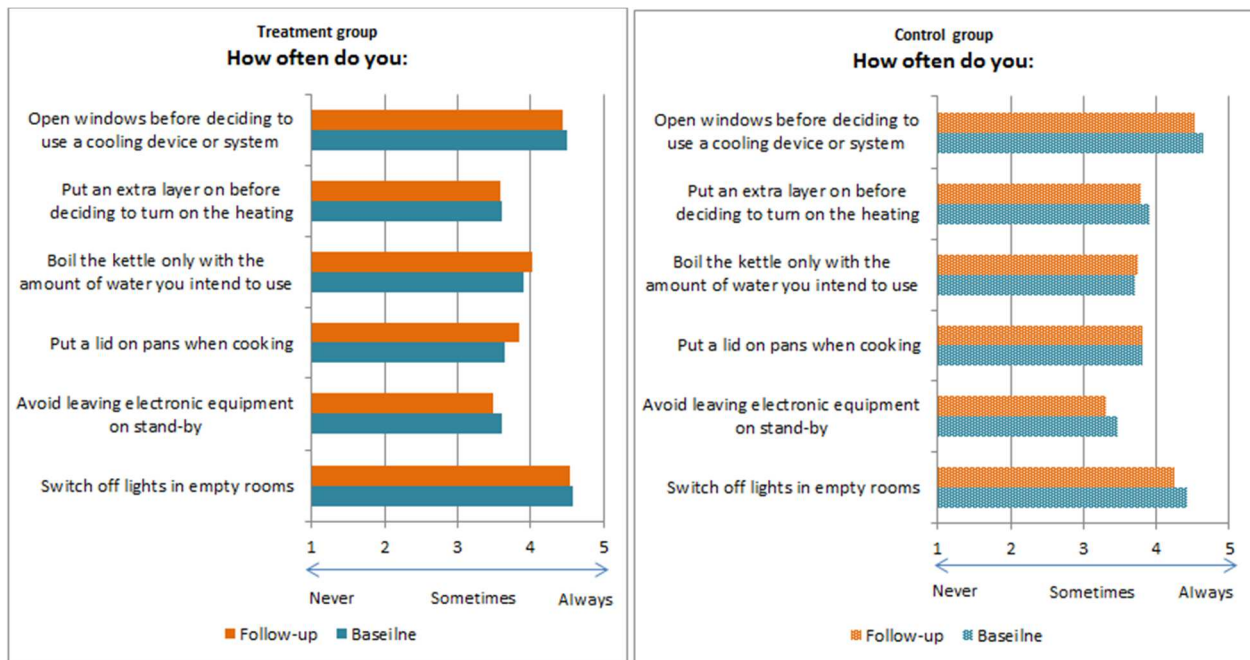


Figure 15 Mean values for frequency in which energy saving actions are performed (treatment and control group)

In the case of the treatment group a decrease is observed in the frequency that three out of six targeted behaviours are performed. However, none of these decreases is statistically significant. A statistically significant increase is observed in the frequency that a lid is put on pans when cooking ($t(141)=-2.290$, $p<.05$).

In the case of the control a decrease is observed in the frequency that four out of six targeted behaviours are performed. A statistically significant decrease occurred in the frequency that lights are switched off in empty rooms ($t(118)=2.658$, $p<.05$). No statistically significant increase is observed for any of the targeted energy saving behaviours.

Table 29 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	4,57	,60	4,55	,58	-0,02	0%
	control	4,42	,69	4,24	,82	-0,18*	-4%
Avoid leaving electronic equipment on stand-by	treatment	3,61	1,17	3,49	1,10	-0,11	-3%
	control	3,46	1,10	3,31	1,00	-0,15	-4%
Put a lid on pans when cooking	treatment	3,65	1,23	3,85	1,04	0,20*	5%
	control	3,80	1,12	3,80	1,16	0,00	0%
Boil the kettle only with the amount of water you intend to use	treatment	3,91	1,10	4,01	,96	0,11	3%
	control	3,71	1,08	3,74	1,06	0,03	1%
Put a jumper or an extra blanket before deciding to turn on the heating	treatment	3,61	1,20	3,59	1,21	-0,02	-1%
	control	3,90	1,19	3,79	1,27	-0,11	-3%
Open windows to cool down before deciding to use a cooling device or system	treatment	4,51	,86	4,44	1,00	-0,06	-1%
	control	4,63	,73	4,52	,92	-0,11	-2%

*: statistically significant change ($p<.05$)

4.3.6 Behavioural antecedents

Overall, seven items from seven 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 for the majority of items.

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 two groups.

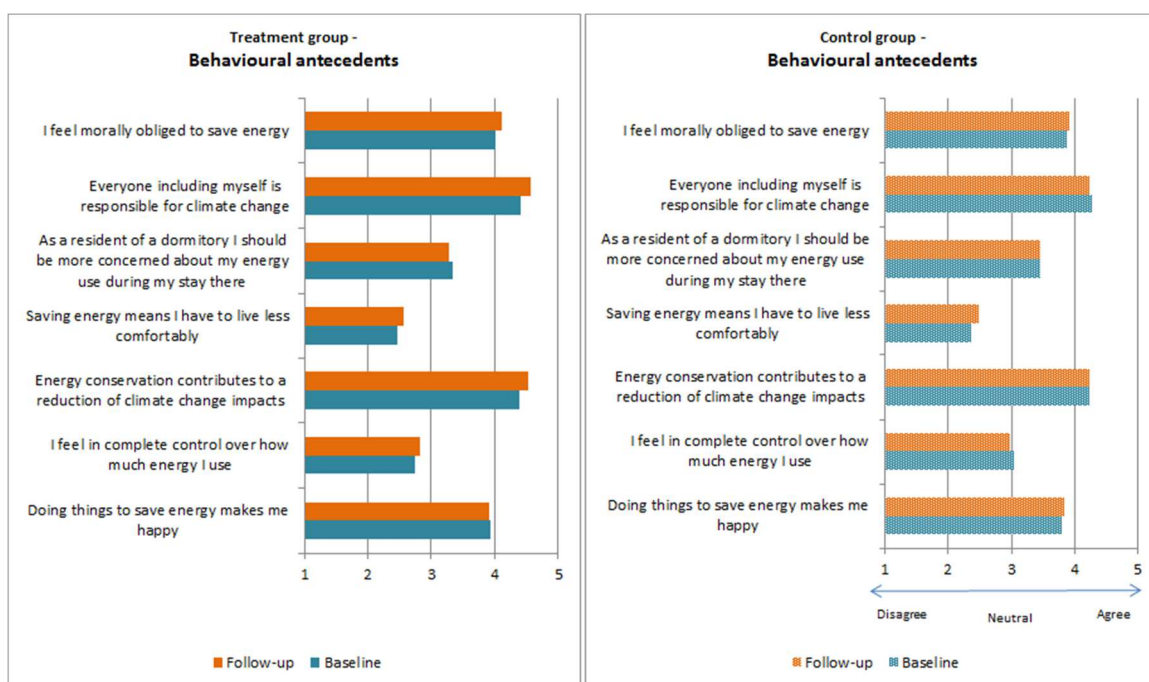


Figure 16 Mean values for behavioural antecedents (treatment and control group)

Personal norms

Personal norms were measured with one item. No statistically significant change is observed in any group.

Table 30 Mean values and standard deviations for personal norms items (treatment and control group)

I feel morally obliged to save energy					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Treatment	4,01	,98	4,11	,84	0,09
Control	3,89	,99	3,92	,98	0,03

*: statistically significant change

Ascription of responsibility

Ascription of responsibility was measured with one item. A significant change is observed in the treatment group in ascription of responsibility ($t(141)=-2.580, p<.05$). The increase in the mean value at the end of the academic year is indicative of an increase in the sense of responsibility for climate change.

Table 31 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	4,40	,91	4,57	,62	0,17*
Control	4,28	,77	4,24	,82	-0,05

*: statistically significant change

Awareness of consequences

Awareness of consequences was measured with one item. A somewhat statistically significant change is observed in the treatment group ($t(141)=-1.911$, $p=.058$). The increase in the mean value at the end of the academic year is indicative of an increase in awareness of energy consumption contribution to climate change.

Table 32 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	4,39	,84	4,54	,73	0,15*
Control	4,24	,71	4,24	,78	-0,01

*: statistically significant change

Attitudes

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

Table 33 Mean values and standard deviations for attitudes items (treatment and control group)

Saving energy means I have to live less comfortably					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Treatment	2,46	,96	2,56	,96	0,10
Control	2,37	1,06	2,49	1,01	0,13

*: statistically significant change

Perceived behavioural control

Perceived behavioural control was measured through one item. No statistically significant change is observed in any group.

Table 34 Mean values and standard deviations for perceived behavioural control items (treatment and control group)

I feel in complete control over how much energy I use					
	Baseline		Follow-up		Change in mean value
	M	SD	M	SD	
Treatment	2,75	1,02	2,82	1,03	0,08
Control	3,05	1,15	2,98	1,04	-0,07

*: statistically significant change

Emotions

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

Table 35 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	3,93	,77	3,91	,78	-0,02
Control	3,80	,93	3,84	,92	0,05

*: statistically significant change

Role beliefs

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

Table 36 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	3,35	,99	3,28	1,07	-0,06
Control	3,46	1,07	3,46	1,13	0,00

*: 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 top two important drivers of energy consciousness are common in both groups: it's a habit adopted from home and it saves energy. The third most important reason is different for the two groups. In the treatment group the third most important reason is "it's the right thing to do", while in the control group it's "it helps reduce global warming". 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 in the control group. The differences are at the level of 0% to 3%. In the treatment group the level of change is higher for a number of items in the list. The proportion of students selecting "it saves energy" has increased by 5%, while for those selecting "it's the right thing to do" it has increased by 7%.

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

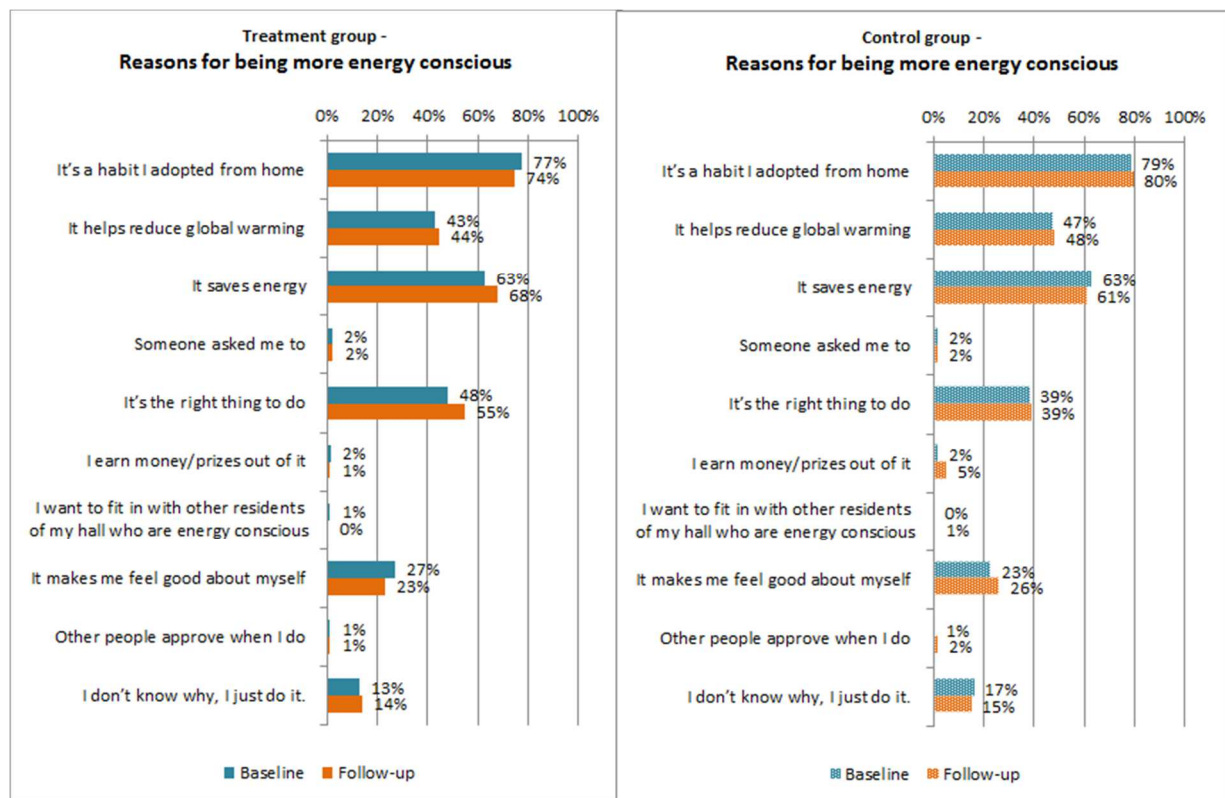


Figure 17 Reasons for being more energy conscious (treatment and control group)

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 for the treatment group while in the control group lack of inspiration from the hall management was in the top three reasons instead of structural/system limitations.

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.

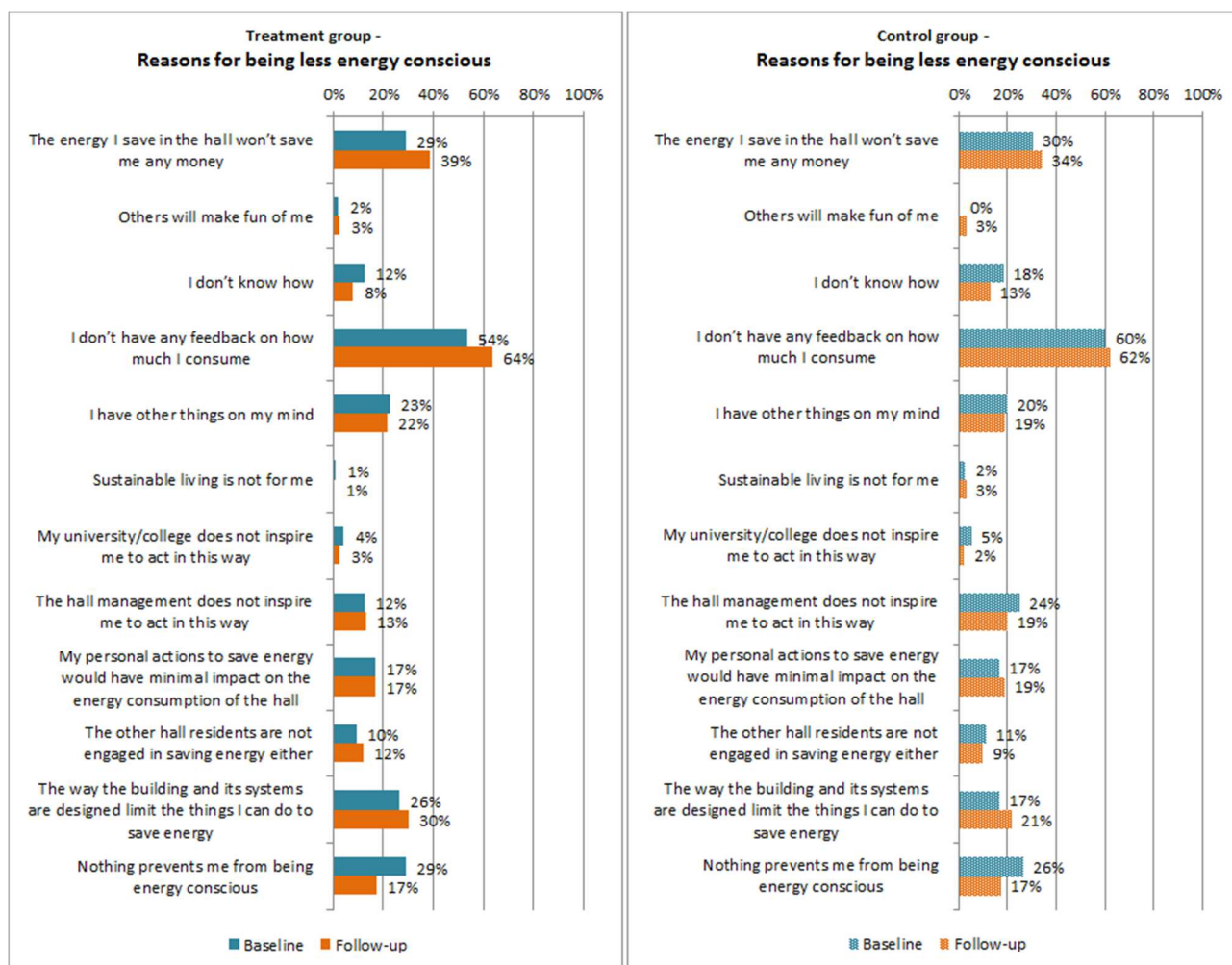


Figure 18 Reasons for being less energy conscious (treatment and control group)

5. Study of retention of behaviour when moving into private accommodation

In the second year of the Student Switch Off implementation a questionnaire survey was also conducted with students who lived in participating dormitories in 2014/15 but moved into private accommodation in 2015/2016. The aim of this survey was to help identify whether the energy-saving actions established during their time in dormitories have been carried forward. The survey did not have a specific response target. Overall, 98 valid responses were collected in total.

5.1 Results

On the question whether their awareness on how to save energy increased as a result of information/posters/messages students received from the Student Switch Off campaign 68% of respondents gave a positive answer ("a lot", "a fair amount", "a little"). Thirty two per cent of respondents think that their energy awareness did not increase at all as a result of the SSO campaign (Figure 19).

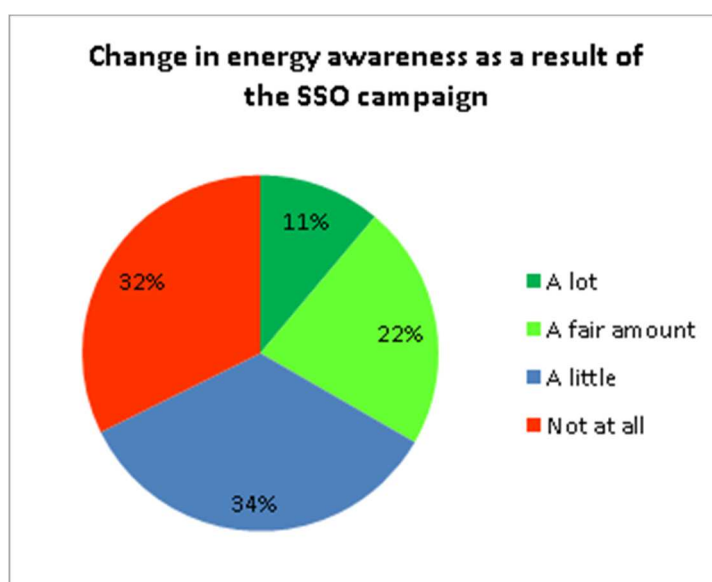


Figure 19 Change in energy awareness as a result of the SSO campaign

On the question whether they took action to save energy as a result of the SSO campaign last academic year 70% of respondents gave a positive answer ("a lot", "a fair amount", "a little"). Twenty eight per cent of respondents did not take any energy saving action as a result of the SSO campaign (Figure 20).

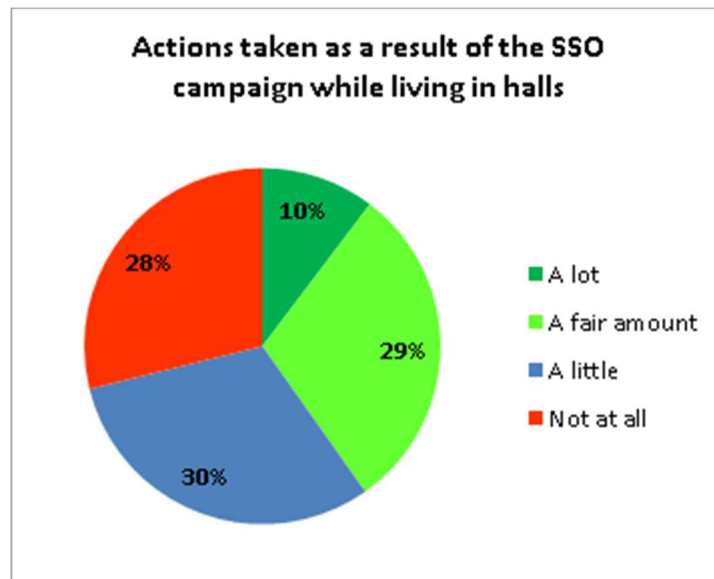


Figure 20 Actions taken as a result of the SSO campaign while living in dorms

The respondents that gave a positive answer to the question *"Did you take actions to save energy as a result of the Student Switch Off campaign last academic year?"* were asked if they continue to take those actions in their current life. Almost all respondents (99%) gave a positive answer ("a lot", "a fair amount", "a little") (Figure 21).

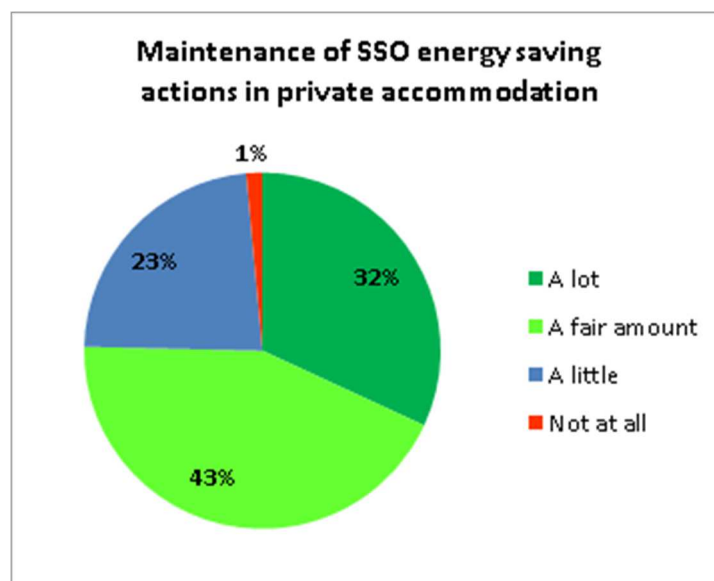


Figure 21 Maintenance of SSO energy saving actions in private accommodation

The respondents that maintain the behaviours they adopted through SSO were asked the reason why they continue to take them in their current life outside the dorms. The majority of respondents (74% of respondents) continue to take energy saving actions to save money (Figure 22). A large number of respondents also continue to take the energy saving actions because they have gotten into the habit of saving energy (56% of respondents) and to take personal action on climate change (48% of respondents). Encouragement from flatmates and saving time were the least popular reasons (3% and 6% of respondents, respectively).

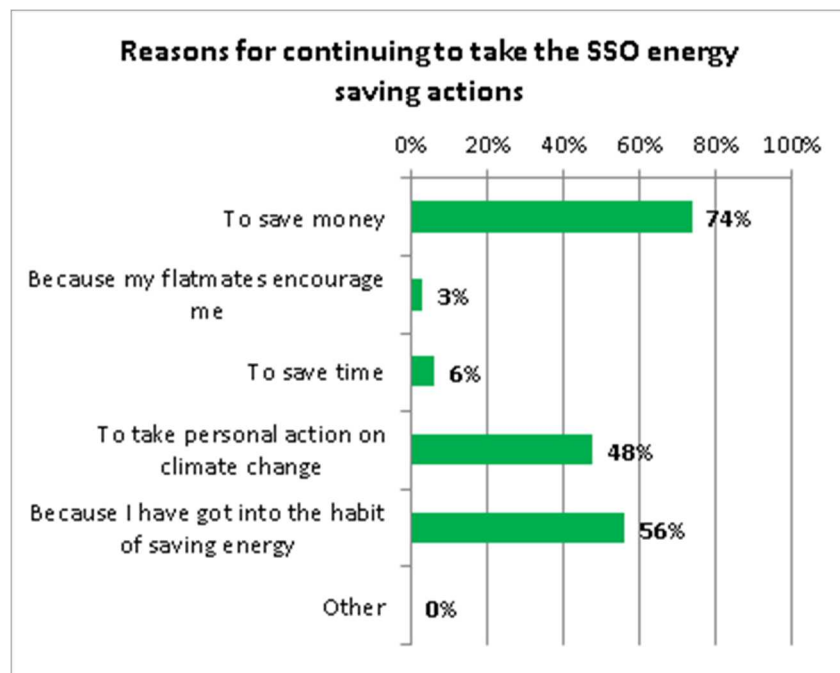


Figure 22 Reasons for continuing to take the SSO energy saving actions

The frequency in which respondents take the energy behaviours targeted by Student Switch Off are similar to that of students living in dorms (Figure 23). No statistically significant differences were found for any of the 6 behaviours.

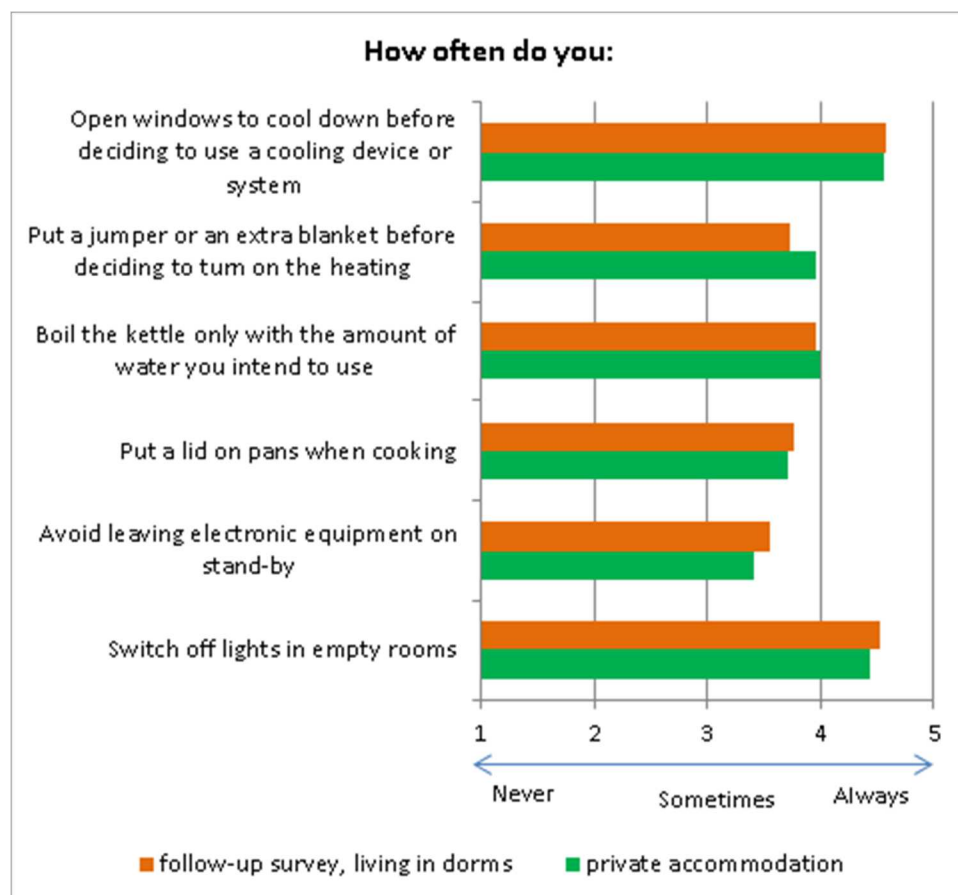


Figure 23 Mean values for frequency in which energy saving actions are performed (follow-up survey respondents and respondents that now live in private accommodation)

The behaviours with the higher frequency are those of switching off lights in empty rooms and opening windows for cooling through ventilation (Table 37). The behaviour applied least frequently is that of avoiding leaving electronic equipment on stand-by.

Table 37 Mean values and standard deviations for the frequency in which energy saving actions are performed (students now living in private accommodation)

Action	M	SD
Switch off lights in empty rooms	4,43	,75
Avoid leaving electronic equipment on stand-by	3,41	1,12
Put a lid on pans when cooking	3,72	1,05
Boil the kettle only with the amount of water you intend to use	4,00	,95
Put a jumper or an extra blanket before deciding to turn on the heating	3,96	,99
Open windows to cool down before deciding to use a cooling device or system	4,56	,71

6. Summary of main findings

6.1 Findings on energy saving

Pre-intervention electricity consumption was measured at each participating dormitory to establish the level of consumption prior to the influence of the student switch-off campaign. These data were then used to predict consumption in each hall for subsequent years. In cases where electrical heating was used the baseline consumption was adjusted for degree days. Actual consumption was then measured for the period 2015-2016 and compared to the baseline figures to establish an estimate of the savings achieved by the project.

The total adjusted baseline for the project in 2015-2016 was 29104 MWh. Total consumption measured during the period was 26556 MWh, a total reduction of 2548 MWh of electricity (219 tonnes of oil equivalent). This reduction, when accounting for the carbon intensity of national electricity generation equates to a reduction of 1,107 tonnes of CO₂ emissions.

On a country-by-country basis, with the exception of Greece, savings achieved in the project were broadly proportional to the baseline consumption in participating halls. That is, countries with larger baselines made larger savings. The majority of electricity consumption took place in UK universities and the UK saw the largest absolute savings followed by Lithuania and Sweden. However, it is interesting to note that percentage savings were actually consistently higher (again, with the exception of Greece) in countries with smaller baselines. This may suggest larger student cohorts are more difficult to fully engage. In terms of percentage saving from the baseline Cyprus achieved a very impressive 41.2% saving but since Cyprus was the smallest consumer in absolute terms this saving is a small contributor to the overall figures. This result may be partly due to the fact that in Cyprus it was possible to engage directly with every single student.

6.2 Findings of pre- post-intervention survey

The follow-up student questionnaire survey was circulated in all dormitories implementing the Student Switch Off campaign and to a control group in Linköping, 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 726 has been achieved with a total of 745 matched respondents. The valid for the treatment group is 185 and for the control group 127.

DEMOGRAPHICS

Gender

- A large number of female, compared to male respondents participated in the survey in total.
- The number of female respondents is higher than the number of male respondents in Cyprus, Lithuania, Sweden and the UK. In Greece the same number of male and female students participated in the survey. The largest proportion of female respondents is found in Cyprus and in Lithuania (67% and 66%, respectively) while the largest percentage of male respondents is found in Greece (50% male).
- The proportion of female respondents in the treatment group is higher than the proportion of female respondents in the control group (54% female in the treatment group, 43% in the control group). Differences found in gender between groups are not statistically significant.

Age

- Almost half of the respondents (48%) are between 18-20 years of age. Lithuania and the UK have the youngest population of respondents with the majority of respondents (57% and 68%, respectively) being between 18-20 years of age.
- In Cyprus, Greece and Sweden the proportion of students that are between 21-24 years of age is higher than the proportion of students between 18-20. In Greece and in Sweden a significant number of students is also between 25-29.

- The population of the control group is “younger” than the population of the treatment group with a higher proportion of students between 18-24 years. Age differences between the groups are statically significant.

Nationality

- The majority of respondents are native to the country they study in (64% of total). In 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 (20% and 28%, respectively), while in Cyprus, Greece and Lithuania no international non-EU students are met.
- The biggest majority (69%) of the respondents of the control group are native to the country they study in while less than half of the respondents from the treatment group are native. The differences in origin between the two groups are statistically significant.

Level of education

- Overall, a good mix of students from different years and levels of education is found. The majority of respondents (72%) are undergraduates, while 26% are postgraduates. Two percent of total respondents are exchange students (Erasmus or international), top-up students or research associates and study in Sweden and the UK.
- The proportion of first year students in the UK is really high (70%) while in Sweden it is significantly low (5%). Sweden has the biggest percentage of post-graduate students (42%).
- In the control group the proportion of first year students is much higher than that of the treatment group (30% and 5%, respectively). The two groups have similar proportions of masters students but PhD students are only found in the treatment group. Exchange students are also found at a higher percentage in the treatment group (4% in the treatment group, 1% in the control group). Differences between the groups in the year of study are statistically significant.

Subject of study

- Respondents study all main subjects in all countries.
- Overall, the biggest percentage of respondents (33% of total) study architecture, engineering or technology and are assumed to have the best level of knowledge or awareness of energy saving issues. The highest proportion of respondents studying architecture, engineering or technology is found in Lithuania (49% of respondents) and the lowest in Cyprus (13% of respondents).
- The second most represented subject of study (26% of respondents) is social sciences. Arts/Humanities, Health sciences/medicine and mathematics/physical sciences are each studied by 13-14% of respondents.
- The biggest percentage of respondents in both the treatment and control group study architecture, engineering or technology but in the control group this proportion is much higher (53% for control group, 39% for treatment group). Some smaller differences are also found between the two groups for the remaining subjects of study. The differences between the groups in subject of study are somewhat significant.

Living in dorms status

- Almost one third of the respondents lived in dorms of their current dormitory provider/university the previous academic year. At country level this is mostly the case for Cyprus (73%), Greece (67%), Lithuania (60%) and Sweden (59%). These residents are more likely to have heard of or been involved in Student Switch Off the previous year. For 93% of the respondents in the UK this is the first year that the students are living in dorms of their current dormitory provider /university.

LIFESTYLE

Energy saving efforts in future lifestyle

- In all countries except for Sweden the largest proportion of students will be doing a lot more to save energy when they move out of dorms. In Sweden the biggest proportion of students (48% of respondents) will be doing about the same. Only a very small proportion in Lithuania and Sweden (2% and 1%, respectively) think that they will be doing less.
- In the treatment and the control group the biggest proportion of respondents think that they will be doing about the same to save energy when they move out of dorms (48% for the treatment group and 41% for the control group). The proportion of respondents that will be doing more to save energy is higher in the control group than in the treatment group (51% for the treatment group and 59% for the control group). One per cent of respondents from the treatment group think that they will be doing less to save energy when they move into private accommodation.

(PERCEIVED) LEVEL OF INFORMATION

Own energy consumption in dormitories

- Significant differences ($p=.001$) 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 (8% decrease in the mean value overall).
- A decrease is observed in all countries except for Sweden. The decrease in the level of knowledge is statistically significant in Lithuania ($p=.007$) and in the UK ($p<.001$). The biggest reduction in the level of information on what respondents personally consume in their dormitory is met in Greece. 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 building level energy consumption information.
- At the end of the academic year the highest level of knowledge on what respondents personally consume in their dormitory is found in Cyprus and the lowest in Greece and Lithuania.
- No statistically significant change between the baseline and the follow-up survey is found in any of the treatment or control groups. The level of knowledge is at similar levels in the two groups and close to "badly informed". In the treatment group a slight increase is observed while for the control group a slight decrease is observed in the perceived level of knowledge of what respondents personally consume in their dorms.

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 (8% increase in the mean value overall).
- An increase in the level of knowledge is observed in all countries. This change is statistically significant in Sweden ($p<.001$) and somewhat significant in the UK ($p=.064$). The biggest increase in the level of information on what respondents can personally do to save energy in their dormitory is found in Sweden.
- 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 changes 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 ($p<.001$). The change is towards an increase in the level of knowledge with the increase being 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".
- The biggest increase in energy awareness is reported from Greece and the smallest from Lithuania.
- Differences between the treatment and the control group in increase of energy awareness are not statistically significant. The increase in the energy awareness in the treatment group is slightly 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: the Student Switch Off campaign; family and; an article they have read or a documentary they watched.
- The least influential sources of information are: lack of feedback and information on their dormitory's energy consumption; university courses and; friends living in dormitory.
- Student Switch Off receives a high proportion of responses and is in the top three most influential sources of information in all individual countries.
- The top two sources of information that helped increase energy awareness are common between the treatment and control group. Those are: an article/documentary and family.
- The Student Switch Off campaign is the third most influential source of information for the treatment group with 40% of the respondents selecting it. Only 2% of the control group were influenced by Student Switch Off.

HABITS AND PRACTICES

- Overall, an increase is observed in the frequency that the less known energy saving actions are performed, namely putting a lid on pans when cooking and boiling only the right amount of water. The change is statistically significant for putting a lid on pans when cooking ($p < .05$) and somewhat significant for boiling only the right amount of water with the kettle. For the better known energy saving actions of switching off lights in empty rooms and avoiding leaving electronic equipment on stand-by a small decrease in the frequency that they are performed is observed but it is not statistically significant. Putting an extra layer on before using heating and opening windows for cooling did not have a major change.
- 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 a lid is put on pans when cooking (in Cyprus and Sweden) and that the right amount of water is boiled with the kettle (in Greece, Lithuania and the UK).
- The action performed the most often in Cyprus, Greece and Sweden is that of switching off lights in empty rooms. In Lithuania and the UK the action performed most frequently is that of opening windows for cooling.
- The least performed action in Cyprus and the UK is that of putting a lid on pans. In Greece and Lithuania avoiding leaving electronic equipment on stand-by is the action performed least frequently. In Sweden the action performed least often is that of putting an extra layer on instead of the heating (3.61 ± 1.20).
- Still, all actions are performed more often than "sometimes" in all countries.
- In the case of the treatment group a decrease is observed in the frequency that three out of six targeted behaviours are performed. However, none of these decreases is statistically significant. A statistically significant increase is observed in the frequency that a lid is put on pans when cooking ($p < .05$). In the case of the control no statistically significant increase is observed for any of the targeted energy saving behaviours. However, a statistically significant decrease occurred in the frequency that lights are switched off in empty rooms ($p < .05$).

BEHAVIORAL ANTECEDENTS

- Between the baseline and follow-up survey statistically significant changes are found for only one out of seven studied items of behavior change theory and models, therefore, no single theory or model is verified with change in all its relevant variables.
- The item with the statistically significant change is the attitude that says "saving energy means I have to live less comfortably". The change in this item has a negative meaning as it implies an increase in the level that respondents think that saving energy means they have to live less comfortably. In emotions no change is found. In all other items a change with a positive meaning is observed (personal norms, ascription of responsibility, awareness of consequences, perceived behavioural control, role beliefs).
- Visual comparison of the mean value diagrams shows similarities (similar trends) in the mean values for all items between the treatment and control group. However, changes observed in the treatment group appear to be greater than the ones in the control group for the majority of items.

Personal norms

- In Greece a significant increase in the feeling of moral obligation to save energy is observed.

Ascription of responsibility

- In Greece and in Sweden (treatment group) a significant increase in the ascription of responsibility for climate change is found.

Awareness of consequences

- A somewhat statistically significant increase in awareness of energy consumption contribution to climate change is observed in the Sweden (treatment group).

Attitudes

- A statistically significant increase in the level that respondents in the UK think that saving energy means they have to live less comfortably.

Perceived behavioural control

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

Emotions

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

Role beliefs

- A statistically significant increase in the role belief that as residents of dormitories respondents should be more concerned about their energy use there is observed in Greece, while a somewhat significant change towards the opposite direction is observed in Lithuania.

DETERMINANTS OF ENERGY SAVING

Incentives

- The fact that it is a habit adopted from home is in the top three reasons for saving energy in all countries.
- The second and third reason varies between countries. In Lithuania, Sweden and the UK "it saves energy" and "it's the right thing to do" are the other two top reasons for being more energy conscious. In Cyprus they are "it saves energy" and "it makes me feel good about myself" while in Greece the other two top reasons are "it helps reduce global warming" and "it makes me feel good about myself".
- Between the baseline and follow-up survey there is no change in the items in the top three list except for one item in Greece. In the baseline survey "it saves energy" was in the top three reasons. In the follow-up survey this changed to "it helps reduce global warming".
- 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.
- In Cyprus and Greece significant changes are observed in a number of items. This is mainly attributed to the small sample size rather than a more significant change compared to the other countries. In Cyprus a significant decrease is observed in the number of students that consider "it's the right thing to do" as an important reason for being more energy conscious, while a significant increase is observed in the number of students that selected "it helps reduce global warming" in the follow-up survey. In Greece the biggest increase is found for "it helps reduce global warming", while the biggest decrease is found in "it saves energy". In Lithuania the most significant decrease is found in "it saves energy" while a significant increase is found in those saying that "I don't know, I just do it". In Sweden and the UK changes are rather small; between 0% and 4% for Sweden, while in the UK the change does not exceed 2% for any of the listed items.
- The top two important drivers of energy consciousness are common for the treatment and control group. Those are: it's a habit adopted from home and it saves energy. The third most important reason is different for the two groups. In the treatment group the third most important reason is "it's the right thing to do", while in the control group it's "it helps reduce global warming". These reasons were the top drivers of energy saving in the baseline survey as well in both groups.
- The least important reasons for being more energy conscious are common for both groups and are: those associated with other peoples' opinion namely: fitting in with other residents of the dormitory, other peoples' approval and someone else asking.
- Overall, no significant differences are observed in the ranking of drivers of energy consciousness in the control group. The differences are at the level of 0% to 3%. In the treatment group the level of change is higher for a number of items in the list. The proportion of students selecting "it saves energy" has increased by 5%, while for those selecting "it's the right thing to do" it has increased by 7%.

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. Building structure and systems is in the top three reasons for all countries except for Lithuania.
- A difference in the ranking of top reasons is also found between the baseline and follow-up in individual countries. However, lack of energy consumption feedback was in the top three reasons for being less energy conscious in the baseline survey in all countries as well. In the baseline survey limitations in the building structure and it's systems was not in the top three reasons for all countries except for Sweden.
- The three most important barriers in energy saving are common between the treatment and control 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 for the treatment group while in the control group lack of inspiration from the hall management was in the top three reasons instead of structural/system limitations.

- 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.

6.3 Findings on retention of behaviours survey

Ninety eight valid responses were collected for the questionnaire survey that was conducted with students who lived in participating dormitories in 2014/15 but moved into private accommodation in 2015/2016. The survey did not have a specific response target.

The findings suggest a significant impact from Student Switch Off on respondents while living in dorms and a retention of the energy saving habits in their current lives outside dorms.

- When living in dorms the awareness on how to save energy increased as a result of information/posters/messages students received from the Student Switch Off campaign for 68% of the respondents
- Seventy per cent of respondents took action to save energy as a result of the SSO campaign last academic year.
- From the 70% of respondents that took action to save energy as a result of the SSO campaign last academic year almost all of them (99% of respondents) continue to take those actions in their current life.
- The majority of respondents (74% of respondents) continue to take energy saving actions in their current lives to save money. A large number of respondents also continue to take the energy saving actions because they have gotten into the habit of saving energy (56% of respondents) and to take personal action on climate change (48% of respondents). Encouragement from flatmates and saving time are not popular reasons for taking energy saving actions (3% and 6% of respondents, respectively).
- The frequency in which respondents take the six energy behaviours targeted by Student Switch Off are similar to that of students living in dorms. No statistically significant differences are found between the two groups of respondents for any of these behaviours.
- The behaviours applied at the highest frequency are those of switching off lights in empty rooms and opening windows for cooling through ventilation. The behaviour applied least frequently is that of avoiding leaving electronic equipment on stand-by.

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?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
what you personally can do to save energy in your hall?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 4. 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
Doing things to save energy makes me happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel in complete control over how much energy I use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Energy conservation contributes to a reduction of climate change impacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Saving energy means I have to live less comfortably	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a resident of a hall of residence I should be more concerned about my energy use during my stay there	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Everyone including myself is responsible for climate change	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel morally obliged to save energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 5. Which of the following actions do you think can help save energy?

[Select all that apply]

- ☐ 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
- ☐ All of the above
- ☐ None of the above

* 6. 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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid leaving electronic equipment on stand-by	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put a lid on pans when cooking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boil the kettle only with the amount of water you intend to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put a jumper or an extra blanket before deciding to turn on the heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Open windows to cool down before deciding to use a cooling device or system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 7. 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	<input type="checkbox"/>
It helps reduce global warming	<input type="checkbox"/>
It saves energy	<input type="checkbox"/>
Someone asked me to	<input type="checkbox"/>
It's the right thing to do	<input type="checkbox"/>
I earn money/prizes out of it	<input type="checkbox"/>
I want to fit in with other residents of the hall who are energy conscious	<input type="checkbox"/>
It makes me feel good about myself	<input type="checkbox"/>
Other people approve when I do	<input type="checkbox"/>
I don't know why, I just do it.	<input type="checkbox"/>
Other (please specify)	<input type="text"/>

* 8. 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	<input type="checkbox"/>
Others will make fun of me	<input type="checkbox"/>
I don't know how	<input type="checkbox"/>
I don't have any feedback on how much I consume	<input type="checkbox"/>
I have other things on my mind	<input type="checkbox"/>
Sustainable living is not for me	<input type="checkbox"/>
My university/college does not inspire me to act in this way	<input type="checkbox"/>
The hall management does not inspire me to act in this way	<input type="checkbox"/>
My personal actions to save energy would have minimal impact on the energy consumption of the hall	<input type="checkbox"/>
The other hall residents are not engaged in saving energy either	<input type="checkbox"/>
The way the building and its systems are designed limit the things I can do to save energy	<input type="checkbox"/>
Nothing prevents me from being energy conscious	<input type="checkbox"/>
Other (please specify)	
<input type="text"/>	

* 9. 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

* 10. 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)

* 11. 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. 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 - Changes to the follow-up questionnaire survey in Year 2

In year 2 of the campaign some minor adjustments were made to the questionnaire survey. These adjustments were either additions of questions to help increase clarity in some areas or removal of questions to help eliminate respondent fatigue. The adjustments involve a very small number of questions that were either found to be too long in length or did not give strong findings at the end of the year. These questions were either reduced to the minimum necessary length or were removed, respectively. The study variables removed from the methodology in year 2 are the following:

Lifestyle

- *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'.

Socio – psychological variables

- *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"). The second item was removed.

- *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'). The first item was removed.

- *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 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"). The self-efficacy item was removed.

- *Subjective norms (SN)*

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. Both items were removed.

- *Intention (INT)*

Intentions are considered immediate antecedents of behaviour.

Intention was measured through the item "I intend to try harder to reduce my energy use this academic year" and was removed in year 2 of the survey.

Appendix C – Variables from behaviour change theory and models

Variable	Item code	Items	NAM	TPB	TIB	Maintained in Year 2
Personal norms	PN-1	I feel morally obliged to save energy	✓		✓	Y
	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	✓			Y
Awareness of consequences	AC-1	Energy conservation contributes to a reduction of the climate change impacts	✓			Y
Attitude	ATT-1	Saving energy is too much of a hassle		✓	✓	
	ATT-2	Saving energy means I have to live less comfortably				Y
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				Y
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			✓	Y
Role beliefs	ROL-1	As a resident of the dorms I should be more concerned about my energy use during my stay there			✓	Y
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



Appendix D – Questionnaire survey for the students that have moved out of dorms (UK version)

* 1. Are you currently living in halls of residence?

- ☐ Yes
☐ No

* 2. When you lived in halls last year, did your awareness of how to save energy increase as a result of information/posters/messages from the Student Switch Off campaign?

- ☐ Yes, a lot
☐ Yes, a fair amount
☐ Yes, a little
☐ No change at all

* 3. Did you take actions to save energy as a result of the Student Switch Off campaign last academic year?

- ☐ Yes, a lot
☐ Yes, a fair amount
☐ Yes, a little
☐ No, not at all

* 4. You mentioned that you took actions to save energy as a result of the campaign last year, are you still taking those energy saving actions now?

- ☐ Yes, a lot
☐ Yes, a fair amount
☐ Yes, a little
☐ No, not at all

* 5. Why do you continue to take those energy-saving actions now? [Select all that apply]

- ☐ To save money
☐ Because my flatmates encourage me
☐ To save time
☐ To take personal action on climate change
☐ Because I have got into the habit of saving energy
☐ Other (please specify)

* 6. 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	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid leaving electronic equipment on stand-by	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put a lid on pans when cooking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boil the kettle only with the amount of water you intend to use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Put a jumper or an extra blanket before deciding to turn on the heating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Open windows to cool down before deciding to use a cooling device or system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Name

First name

Last name

* 8. Email address

Email