ENERGISE

EUROPEAN NETWORK FOR RESEARCH, GOOD PRACTICE AND INNOVATION FOR SUSTAINABLE ENERGY

LIVING LAB COUNTRY REPORT - IRELAND

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SUMMARY PAGE

ENERGISE Living Labs (ELLs) employ practice-based approaches to reduce energy use in households while co-creating knowledge on why energy-intensive practices are performed and how they depend on the context in which they are performed. Altogether 16 living labs were implemented in eight European countries in 2018.

The Irish ELLs were led by the ENERGISE team from the National University of Ireland, Galway (NUIG). The ENERGISE Living Labs were implemented in one county (Tipperary) in the midlands of Ireland, approximately 150 kilometres from Galway City. Households from across Tipperary were recruited through the two implementation partners; Tipperary Energy Agency and a second level school in a rural village. ELL1 consisted of 20 households, all living in single family homes and predominantly detached houses in rural areas. The recruitment for ELL1 was done through the Tipperary Energy Agency's (TEA) existing network and media channels and through a profile in the local newspaper of the researcher responsible for implementing the ELLs. ELL2 consisted of 18 households, all living in single family homes and predominantly detached houses in rural areas. The recruitment for ELL2 was done through Scoil Ruain, a school for second level education in a small rural village, Killenaule, 20 kilometres from the nearest town (Thurles). The two ELLs were varied according to type and construction of buildings with the majority of the houses detached and in rural areas. ELL1 was recruited as a community of interest, with TEA contacting households that had signed up to their newsletters and social media sites. ELL2 was recruited as a community of place, with the majority of the participants in a location close to the school. The community for ELL2 included current and past staff, past students and families of current and past students and others within close proximity of the school. Both ELLs included hard-to-reach groups in rural areas and a mix of household profiles. The profile of households were mixed with 10 households with children under 11, 10 households with children over 10 years old. 9 of the households were based in towns (were a mix of terraced and detached), 7 in villages (all detached houses) and 21 were detached houses in rural areas. All households in ELL2 were in rural areas with 3 of them based in villages. The active ELL period ran from 1st October 2018 to 9th December 2018.

Most of the ELL participants in Ireland took the common ELL challenges of halving the number of wash cycles in laundry and reducing indoor temperatures to 18 degrees Celsius. The households reduced the number of wash cycles by 15% and the temperature reduction was by less than one degree, on average. The small reduction in temperature may have been because of an abnormally mild autumn, thus the baseline period did not record heating practices in the participants' homes. The main changes in practices related to laundry was for households to get more wears out of their clothes, air out clothes and find alternate ways of cleaning or spot washing their clothes. Most households (particularly those with small children) discussed how they had specific types of clothes for around the house and others for work.

Participants spoke about how they had already consumed hot drinks (for example tea), but it was more of a cultural phenomenon associated with comfort rather than a means of keeping warm. After the ELL challenge, several participants stated that they began to use tea as a means of keeping warm along with wearing extra layers of clothing and using blankets while sitting for long periods. Several participants spoke about uncomfortably high levels of heat in their homes prior to the challenge and their lack of awareness of it. These same participants also expressed the negative impact these temperatures had on their energy levels and comfort in the home. These

participants, and others, stated that the biggest change was to adapt their expectations of comfort and to get used to lower temperatures in the home.

There were also some challenges encountered during the ELLs. Access to the households was a problem as they were located in very remote rural areas and the researcher had to travel large distances to get to some of the houses. This made the logistics of getting to all households within a short time very difficult and closing interviews started a few days earlier to account for this. Most of the households (64%) had a stove or open fireplaces. In these cases temperatures were difficult to control as the temperatures produced by these material arrangements fluctuated. Several participants spoke about how they began to put smaller amounts of fuel into their stove or fireplace at more frequent intervals to reduce these fluctuations in temperature. Several participants were quite private and were not keen on having their photos taken for the project. Most households found that a temperature of 18$_o$C was too cold with many settling on 18.5 or 19 degrees. When considering laundry, many of the practices around laundry were influenced by perceptions of workplace and societal expectations with participants unwilling to wear or allow their children to wear the same clothes two days in a row. For many participants the cleanliness and health of their children was a key concern, and they reported that they were unwilling to compromise in relation to their appearance and comfort.

The participants reported that they were very happy to have taken part in the study, and to engage in the challenges. Data from the follow-up survey indicate that the changes in practices developed during the challenge had remained. This indicates that the Living Lab approach was successful with hard-to-reach groups in the Irish context.

1. ELL DESCRIPTION

The Irish ELLs were led by the ENERGISE team from NUIG. Households from across Tipperary were recruited through two implementation partners: Tipperary Energy Agency (TEA) and Scoil Ruain Killenaule. TEA is a very active energy agency and is based in the local area. They also have extensive contacts nationally and internationally in the energy field, and have participated as partners in several H2020 projects. Scoil Ruain is a school for second level education based in the Tipperary area. The school caters for students from the ages of approximately 13-18 years old. The Tipperary region is a mix of urban and rural areas, with small villages, larger towns and one-off rural housing. There are little high-density residential buildings such as multi-story apartment blocks. The region has a significant agricultural sector, primarily consisting of beef and dairy producers. Our site selection ensures that we meet the selection requirements set out in D3.4 of the ENERGISE project. In particular, we considered the following criteria:

- Almost all households in the area can regulate indoor temperatures, thereby making it possible to participate in the general heating challenge proposed;
- The ownership rates of privately-owned washing machines is very high in the area, making it possible for participants to undertake the laundry challenge;
- ELL1 participants are sufficiently dispersed across the region so as to reduce the possibility that they will interact with each, or engage with ELL2 participants;
- ELL2 participants are part of a community of place, and sufficiently removed geographically and socially from ELL1;
- Households of varying composition and hard-to-reach groups are present at both of the ELL sites;
- Energy metering is possible in participating households.

The recruitment for ELL1 was done through the Tipperary Energy Agency, through their existing networks, mailing lists and media channels, etc. Hence, ELL1 could be considered a **community of interest**, with TEA engaging with households that had already signed up to their newsletters and social media sites. The recruitment for ELL2 was conducted through Scoil Ruain, a school for second level education. ELL2, therefore, was recruited as a community of place, with the majority of the participants living in a location relatively close to the school. The participants in ELL2 included current and past staff, past students, families of current and past students and others living within close proximity of the school.

1.1 SOCIODEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF THE ELL PARTICIPANTS

Both ELLs included hard-to-reach groups and a mix of household profiles (e.g. demographics, size of dwelling, location). In total, 20 households were recruited for ELL1 and 18 for ELL2. The profile of households was mixed although there were a large number of cohabiting couples with children in the sample including 10 households with children under 11, and 10 households with children over 10 years old. 58% of households had 4 or more members, with the largest household consisting of 7 members and a further 4 households having 6 members. 40% of households had 2 members; most often these were a married or cohabiting couple. One household consisted of 3 members and there were no single person households in the sample. The average number of persons per dwelling across Ireland is 2.7, although the average size of household for a co-habiting couple with children is 3.85 (CSO, 2016), which is reflective of our sample as it included a large number of this type of household. One reason for the prominence of households with children in our sample is because our recruitment for ELL2 was through a school, which one would associate with families.

One-third of the main contact persons were aged between 30 and 49, 58% were in the 50-69 age bracket and 8% were over 70. No main contact persons were aged under 30. The dominance of people aged between 30 and 69 is reflected in the large number of households with adults and children, as younger people (under 30) are less likely to have children, and older people are more likely to have adult children or be living alone. The main contact person in 80% of households was working either full-time (61%) or part-time (19%). 11% of main contact participants were retired and the remaining were students or unemployed. Main contact participants were in general highly educated, with 86% having tertiary education. This compares with 42% for the general population (CSO, 2016). A further 6% were educated to secondary level, and no participant reported having a basic education (although 8% of responses were in the category other or unknown). Across the general population in Ireland, 42% have third level education, 29% of people have secondary level education, 16% have primary education and 13% have no formal education. In general, women are better educated than men, and older people, particularly over 65, are more likely to have no formal education (CSO, 2016). One reason for the high education rates might be the recruitment of participants through a second level school, which included teachers and past students. Therefore, this cohort is significantly more likely to have completed second or third level education. Also, in relation to ELL1 recruitment, participants would already have pre-engagement with the energy agency implementation partner, with many recruited through social media campaigns. This again would indicate that participants might be more likely to be educated.

Table 1. Sociodemographic and socioeconomic characteristics of participating households
Source: recruitment survey.

Household size (n=)	**1 member**	**2 members**	**3 members**	**4 members or more**
%	0	39	3	58
Age of contact person (n=)	29 or younger	30-49	50-69	70 or older
%	0	33	58	8
Employment status of contact person (n=36)	Full-time employed or entrepreneurs	Part-time	Student//Unemployed	Retired
%	61	19	8	11
Educational level of contact person (n=39)	Tertiary	Secondary/vocational	Primary	Other or unknown
%	86	6	0	8

1.2 REASONS FOR PARTICIPATING AND PRIOR EXPERIENCE OF ENERGY INITIATIVES

The primary method for enlisting participants was via local implementation partners. Several participants stated that they were interested in getting involved in the study as they wanted to reduce the cost of their bills. Several others expressed their interest in the project thinking that it was an audit of their home, but when they learned that it was about changing their practices, they stated that they were still interested in taking part in an experiment in their home. Many participants in ELL1 had an existing interest in reducing their energy consumption and were subscribers to the Tipperary Energy Agency's newsletter. Participants in ELL2 took part in the project because others in their social circle took part it, or because their children were interested in taking part.

Using a school as an implementation partner helped to gain a balanced group of participants, including families with young children, with 53% of participants having previously taken part in some form of energy initiative in the home, 44% in the school and 36% in the workplace (Table 2). The recruitment team for the NUIG team was small, with one researcher responsible for ELL implementation in Tipperary. This was important in the Irish context to provide continuity for the participants as hard-to-reach households and to develop a trust based relationship with them. There were several differences in implementation in the Irish ELLs that were context sensitive. The NUIG team started the recruitment much closer to the start of the ELLs as too long a recruitment phase is unusual in Ireland and could mean that some participants might disengage from the study. The recruitment method was through gatekeepers in the communities as they were generally small tight-knit rural communities and a trusted intermediary was required for access. During implementation it was evident that participants were confused about how to use the meters so an email was sent with instructions on how to use them. Participants were also confused about the timeline of the project and an email was also sent with a Gantt chart of the timeline for the ELL implementation.

Recruitment for both ELLs was slow initially. After an extensive media recruitment campaign by TEA, the researcher arranged a profile and article in the regional newspaper and TEA informed their newsletter subscribers and spoke about the project in a radio interview. Recruitment was a challenge for ELL2 and participants were slow to enlist. As a result some did not do the full baseline recording and participants were enlisted that didn't necessarily attend the school but that

were in close proximity. Although enlistment was slow, there very high participant retention rate with only one participant not doing the second interview.

Table 2. Share of participants having prior experience of energy initiatives, %, n=37
Source: recruitment survey.

	At home	At work	At school
Information campaign, tips for saving energy	11%	8%	22%
Incentive to buy efficient appliances (including light bulbs)	8%	6%	0%
Incentives to invest in renewable energy (e.g. PV).	3%	3%	0%
Incentives or support for energy efficiency measures (e.g. wall/roof insulation))	22%	14%	11%
Challenge/discussion to change habits and everyday routines	8%	6%	11%
Other	53%	64%	56%

1.3 BUILDING CHARACTERISTICS OF ELL PARTICIPANTS

Households in the two ELLs varied in terms of the type and construction of buildings, with the majority of the houses being detached and located in rural areas. 9 of the households were based in towns (with a mix of terraced and detached housing), 7 households were based in small villages (all detached houses), and 21 were detached houses located in rural areas. All households in ELL2 were in rural areas, with just 3 of them based in small villages.

Detached houses make up the vast majority of dwellings in rural areas in Ireland (83%), compared to 19% in urban locations and 42% of the overall housing stock (TipperaryLive, 2017). Just 7% of people in Ireland live in apartments or flats, which is easily the lowest proportion across the EU and which are generally located in urban areas. In this regard, our sample is reflective of typical dwellings in rural areas, with a large proportion of detached houses (89%) and no apartments. Ireland also has one of the largest average size of dwelling in Europe. Houses in Ireland also tend to be larger if they are located in rural areas. Combined, these factors contribute to the high number of large dwellings in our sample, with almost 80% of reported house sizes being over 140 m_2. Indeed, 10 of the 14 reported house sizes are more than 200 m_2, with the largest of these being 300 m_2.

The households participating in the study that reported the age of dwelling (n=27) all live in homes that were built after 1980, with more than half built since 2000 (Table 3). This would indicate that many homes are built to relatively high energy building standards, compared with the national housing stock, which is poor in comparison to European average energy efficiency performance.

Oil (37%) is the most common energy source for homes in Ireland, followed by electricity (25%) and gas (21%). Oil is more common in rural areas and mains gas is increasingly common in urban areas. Coal (7%) and peat (7%) are also significant sources of energy, particularly in rural areas where their use is more common than for urban households. Solid fuels are also often used a secondary heating source. In Ireland, 91% of solid fuels used go toward heating, compared with 78% for oil, 72% for gas, and just 10% for electricity. Our sample shows 2/3 of participants using oil as their main heating source, with heat pumps also significant at 17%. As the participants are located in rural areas, oil-fired central heating is common and gas heating is uncommon at just 6%, which is what one might expect.

Table 3. Characteristics of the participants' dwellings
Source: recruitment survey.

Type of dwelling (n=36)	Apartment	Terraced/semi-detached	Detached	Other
%	0	11	89	0
Size of dwelling (n=14)	<60 m2	60-100 m2	101-140 m2	>140 m2
%	0	0	20	80
Age of dwelling, built (n=27)	before 1920	1920s-1970s	1980s-2000s	After 2000
%	0	0	44	56

Table 4. Heating sources of ELL participants (n=36)
Source: recruitment survey.

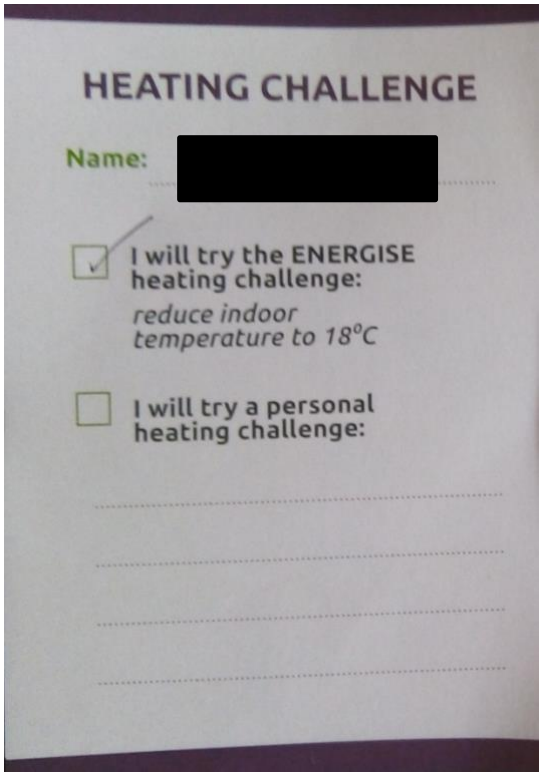
	Primary heating source, %	Secondary heating source, %
Gas	6	3
Oil	67	11
Coal	3	50
Electricity	3	28
Biomass	6	58
Solar collectors	-	8
Heat pump	17	-
District heat	-	-
Other/don't know	-	11

1.4 TOOLS AND APPROACHES USED FOR ELL1 AND ELL2 OUTREACH AND COMMUNICATION

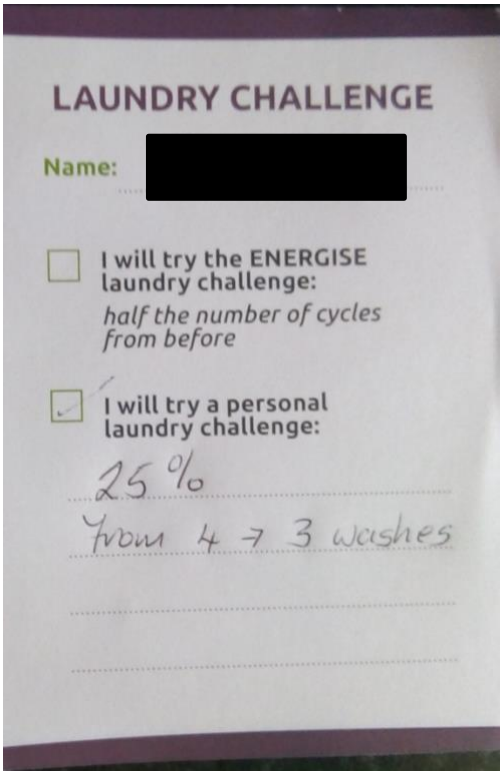
Our primary method for getting people involved was via implementation partners. Implementation partners distributed the details of the project through their existing networks and social media channels. Some participants in ELL1 also signed up having read a profile of the researcher in the local newspaper. Participants contacted the researcher via email to express interest in the project. Following the overall research design, they were then asked to complete the recruitment survey to assess whether they met the criteria for taking part in the project. If they met the criteria, the researcher contacted them to arrange the first house visit. Again. following the overall research design, during the first house visit participants were introduced to the project and given an overview of the Living Lab approach. The meters and temperature loggers were also installed then for both ELL1 and ELL2. After this the deliberation phase began, consisting of interviews in ELL1 and group discussions in ELL2. In these meetings, the households discussed the challenges and received the challenge kits. During the challenges, all households filled in weekly surveys and kept laundry and temperature diaries. A WhatsApp group was created for the ELL2 group to give them the opportunity to discuss in a closed group their expectations and experiences, to share tips and ask questions. Although the researcher created several posts to encourage participants to engage, the participants in ELL2 were not very active in the WhatsApp group but were very open and vocal during the focus groups. Following the overall research design, after the challenges, the households were met again for individual interview (ELL1) and in focus groups (ELL2) to discuss their experiences during the challenges and to garner feedback on the design of the ENERGISE Living Labs. In these events, the diaries and logging thermometers were also collected for the analysis. The households filled in the baseline survey before the challenges, the closing survey

after the challenges, as well as the follow-up survey approximately three months after the end of the challenges.

The ELL design for both ELL1 and ELL2 included laundry and heating challenges. The ELL design included the distribution of ENERGISE challenge kits among the participants to support them during the challenge. The households were given the option to select either the community challenge (reducing temperature to 18 degrees and halving the number of laundry cycles) or developing their own challenge at the individual interviews and focus groups. Challenge cards were distributed so that participants could select their challenge and keep the cards as a reminder of the targets that they set themselves.



Picture 1: Example of challenge card with common challenge selected



Picture 2: Example of challenge card with individual challenge selected

Along with the challenge cards, and a leaflet with hints and tips to achieve their targets, the kits contained a range of items related to heating and laundry. The laundry challenge kits contained an eco-stain remover, a clothes brush, over the door rack, a lint remover a brochure containing hints and tips to achieve their laundry targets.

Picture 3: Example of contents of laundry challenge kit

The heating challenge kits contained a pair of socks, packs of tea, coffee and hot chocolate, a board game, playing cards, and a brochure containing hints and tips to achieve their heating targets.

Picture 4: Example of contents of heating challenge kit

During the first house visit, the electricity meters (Picture 5), temperature loggers and GroEggs were also installed (Picture 6). The GroEgg is a thermometer and nightlight that changes colour to let participants know at a glance the general temperature of a room. The GroEgg glows blue when the room temperature it below 16°C, yellow when between 16 and 20$_o$C, orange between 21 and 24$_o$C and red when over 24$_o$C. The GroEgg also displays the temperature numerically so that the participants could record it.

Picture 5: Electricity meters installed on washing machine and dryer

Picture 6: GroEgg (glowing orange 21.6^{o}C) and temperature logger in place

Participants stated that they were happy to receive the kits, and most used the items in them or gave them to others if they already had them. As some items hadn't arrived for the heating challenge prior to the first house visit, these were sent to participants by mail prior the start of the heating challenge. Many participants stated that they liked getting the tea, coffee and hot chocolate in the mail and felt that it was a good reminder to change their practices.

2. PRACTICES BEFORE THE CHALLENGE (FROM THE DELIBERATION PHASE)

This section examines the practices existing in the households before the challenge. It is based on a survey sent to participants and on qualitative interviews (ELL1) or focus group discussions (ELL2) conducted before the start of the challenge. ELL1 deliberation interviews took place between the 8th of October and the 21st of October 2017 and ELL2 focus groups took place on the 22nd of October. These datasets are complemented, where necessary, with observations made during home visits. In the following, the practices related to thermal comfort are discussed, and then, practices surrounding laundry patterns in the participating ELL households.

2.1 PRACTICES RELATED TO THERMAL COMFORT

A number of studies have indicated that home heating is commonly perceived as a gendered practice with it being defined as a male activity (e.g. Offenberger and Nentwich 2013). Reflecting this literature, many among the Irish ELL participants described these practices as being gendered. Both heating and laundry in the Irish ELLs were often viewed as gendered practices with laundry most commonly discussed as a female activity and heating discussed as male activity with these roles being commonly explicitly stated.

Ireland's building stock is amongst the lowest performing in Northern Europe (Lapillonne et al. 2012) with 15% of household energy consumption from coal, peat and biomass (SEAI, 2018). Several participants stated that they felt it was an unusually mild autumn, and climate data for Ireland reflected this with 238 degree days below 15.5^{o}C in November 2018 in comparison with 262 the previous year (Met, 2019). The heating degree-day weather adjustment assumes that on any day of the year where the average temperature falls below 15.5°C, heating will be turned on to maintain comfortable indoor temperatures (SEAI, 2018). Typically households did not turn on their heat until after mid-October. Participants on average preferred a temperature of 20°C in the living area and 18°C in bedrooms areas with a significant variation from 12°C to 25°C (Table 6). Although one participant stated that 12°C was a desirable temperature before taking part in the challenge, this may not be the case as no participant discussed this as a comfortable temperature

in the interviews. There was no significant difference between the preferences of participants in ELL1 and ELL2.

Table 6. ELL participants' perceptions of desirable temperatures in the winter during daytime before taking part in the ENERGISE challenges (n=34)
Source: baseline survey

	Average ELL1	Average ELL2	Average All	Lowest	Highest
Living area, °C	19	20	20	12	25
Bedroom, °C	18	18	18	12	25
Child's bedroom, °C	18	19	19	12	22

Irish participants were, in general, happy with the temperatures in their homes. Several participants reported that there were differences in perceptions of thermal comfort across the household members. In general, perceptions of comfort were gender and age-related with several participants stating that the adult males in the households felt that temperatures were too warm when the adult females in the house felt comfortable. Open-ended comments suggested that male spouses might feel warmer than female respondents did. Several participants stated that when they felt the temperature was comfortable that other members of the household would be uncomfortable with one participant (IE05) saying:

"So I think we've been more. We're always at 21 or 22 now, whereas before we would have been between 24 and 26. So I like it really warm so I just wear an extra fleece now so that… And it's working already so that's good … (Husband) used to come in and cry because he couldn't tolerate the heat. Like I'd have it up to 35 and then I'd be happy." (IE05, ELL2)

Participants also spoke about the unusually mild autumn and how this impacted on their heating practices, saying that they were turning on the heating less (IE29):

"So it's 23 inside and the outside temperature is 18. But it's not quite 18. It would be more like 3 degrees below that. But we have found, I don't know is it because of the really hot summer or is there heat in the ground or what but we're regulating the heat differently this year than last year." (IE29, ELL1)

Irish heating systems are predominantly central oil-fired heating supplemented by stoves or fireplaces (SEAI, 2018). This was reflected in the baseline survey for the Irish ELLs with 64% of participants regularly using a stove or fireplace to supplement the heating in their living spaces. 67% of participants used oil for their primary source of heating and 13% had either heat pumps or geothermal systems. As a result, almost half of participants (47%) turned off their heating at night, 59% when not at home and 62% turned down heating in unused rooms (Table 7). Some interviewees using heat pumps stated that they turned off the heating when expecting visitors (IE01 and IE21) so that the house didn't get too warm with the extra body heat. Several participants also stated that the tended to turn on the heat if guests were visiting out of concern for their visitors comfort and for perceptions of the warm atmosphere that the fire provides (for example IE06).

"Yes. Oh yeah. He would put the heating up. And I would light the other stove as well … For optical as well as ambiance. You know I would." (IE06 ELL1)

Table 7: Reported frequency of various heating-related practices among the ELL participants in winter-time before participating in the ENERGISE challenges (n=34)
Source: baseline survey.

	Share of households, %
Turn down heating for the night	47%
Turn down heating when not at home	59%
Turn down heating in unused rooms	62%
Has program to automatically turn down heating at certain times	18%
Air rooms for more than a few minutes per day	32%
Turn down heating when airing rooms	41%

Airing of rooms was not very common in the Irish ELLs with only 32% airing rooms for more than a few minutes per day and only 40% pf those turned down the heating while doing so. The airing was a mainly related to reducing incidence of dampness and mould, when it was excessively warm and freshening the air in the rooms.

"If it's a nice day you just open them, just to get a bit of air in really. But I don't feel like I'd use, I don't really open the windows in the winter time. If the weather is bad I wouldn't really. Like we have double doors in a lot of the rooms, so that's what would really be opened more so. In the kitchen maybe to leave out smoke, or maybe if it was excessively warm." (IE09, ELL1)

"Yea just to freshen it out, you know air it out. And here I try and leave them doors open in the morning. Because you're only here for like two hours and then you're gone. So they're all closed again. Because of security you know." (IE11, ELL1)

In most households (58%) the secondary heating in the living spaces was from a fireplace or a stove making temperatures in living spaces difficult to control (Pictures 5 and 6).

Picture 5: Typical living space with typical stove

Picture 6: Typical fireplace

Most households stated that they liked the stove or fireplace and lit it most evenings when it was cooler.

"Every evening now I'm putting on the stove. I love the stove. I just love putting it on. Even when we had just the fire here I was lighting the fire. I put on the stove and open the doors and get the heat upstairs." (IE20, ELL1)

"(Husband) lights the stove every day at half three. On the dot. ((laughter))...and he puts coal in it." (IE39, ELL2)

In most households the heating systems had thermostats which did not require adjusting. These thermostats were typically set to 20$_{o}$C and set to timers to come on at specific times of day. In the bedrooms, the thermostats were typically set to a lower temperature (18$_{o}$C). Participants stated that once they turned on their heat that they tended not to change the settings to temperature during the heating season. Most participants also heated their hot water from their primary heating system meaning that often it was turned on out of heating season so that they could have hot water.

"Ummm… I dislike the way you have to have, like, you've to turn on the oil to heat the water." (IE05, ELL2)

Participants spoke about the changeable weather in Ireland and the high humidity level and concern for dampness in their homes. Most participants spoke about their concern for mould and how important it was to heat their homes to prevent dampness with one participant (IE32) saying:

"We'd always have more layers than we would in the summer although the stove can skew that a little bit. Is it healthy? I think what's really unhealthy for your long-term wellbeing is a damp cold house. So we would aim to not live in those conditions" (IE32, ELL1)

Participants also spoke about how they liked oil-fired central heating because they found it very responsive and they felt that their house heated up very quickly with one participant explaining:

"It's very responsive and the place does heat up quickly." (IE05, ELL1)

Two participants (IE04 and IE10) stated that they didn't know how to alter the settings on their heating system because they didn't know how to change the settings on their thermostat or because their heat pump settings had been changed by those that serviced it.

"We don't and we don't know how to do it … It comes on automatically after a while … And we're very, we feel embarrassed in a lot of ways that we can't do it. And we can't manage it." (IE10, ELL1)

Many participants had retrofitted their houses in the past 10 years (29%) with the majority of these including increased insulation and upgrading of windows (Pictures 8 and 9). As a result the majority of participants stated that they were happy with the thermal comfort levels of their homes.

Picture 8: Typical house having undergone retrofitting (insulation, window upgrades and heat pump installation

Picture 9: Controls for heat pump in a newly retrofitted house

The Irish ELL participants had several ways to keep warm without turning up the heating, even before the start of the challenge. The most common ways were using warm socks or slippers (59%), using extra clothing (76%), using extra blankets (71%) (Picture 10) as well as blinds or curtains on windows (both 68%). Most participants felt that overheating was wasteful, and only those with young children were inclined to heat the space rather than wear more clothes. All participants stated that they were delighted to receive the wool socks in the challenge kits and that they used them during the challenge.

Picture 10: Image of blankets used by one participant to keep warm prior to the challenge

Most households stated that they drink tea and have stews regularly, but that it was for comfort and not necessarily for heat.

"It's lovely to bring a cup of tea up to bed, I, I'm addicted to tea, I'm always drinking tea. No, I never thought about stew as being something to keep you warm." (IE03, ELL1)

When asked about cooking, most participants stated that they enjoyed warm food during the winter, but that they didn't cook them for the extra space heating they may provide.
One participant (IE02) stated that he didn't like wearing blankets in the house or dressing gowns to keep warm with another participant (IE22) stating that they preferred to have the space warm rather than having to wear extra clothes.

"And I hate seeing people wrapped in blankets … I have a pet hate of it, I hate seeing people in dressing gowns, because they wear them to keep warm. And I don't like people who are actually wrapped in blankets actually." (IE02, ELL2)

"I prefer the heat in the house than putting on layers" (IE22, ELL2)

Participants also spoke about how their heating needs varied throughout the day, with some saying that they wanted to come home to a warm home and need the heat less in the morning.

"In the winter I put on the heating on for two hours to heat the rest of the house…we never put on in the morning…it only goes on for two hours in the night in the winter and then I have a stove in the evening…at about half six…that keeps the living room very warm" (IE36, ELL2)

Practices related to thermal comfort of the Irish ELL participants are, in general, made up of similar material elements. The Irish ELL participants lived in similar types of homes (detached in rural locations) with similar kinds of heating systems (67% oil-fired central heating and 58% with fireplaces or stoves as supplemental heating in the living area). This is to some extent reflected in preferences for indoor temperatures with preferred temperatures in the living area at 20$_{o}$C. Several participants also spoke about how their hot water is also heated from their oil-fired central heating and as a result they routinely turn on their heating when not needed for space heating. Participants

also spoke about their attachment to the stove or fireplace and how they routinely lit them for ambiance rather than thermal comfort. Because most of the houses in the Irish ELLs were detached (89%) or semi-detached (11%), people relied on their own experience to attain desirable thermal comfort. Participants also spoke about the ease of use of their heating systems and how they could easily and quickly control the heat in their homes and as a result rarely used other methods of keeping themselves warm.

2.2 PRACTICES RELATED TO LAUNDRY

Participants' narratives revealed that laundry was a gendered practice among the Irish participants. Among the households with both a male and a female adult, women took care of the laundry in 77% of the cases. Men sometimes put the wash into the washing machine, hung clothes out to dry, and folded or ironed them but women were predominantly responsible for the organisation of the washing and the washing for the entire household (IE33).

"I want my kids to be smart going in so, you know, my son's, it's the materials in the clothes, like his trousers will need to be ironed and Rosie's skirt will need to be ironed but their tracksuits don't but like my husband, I'll want his things to be ironed for him, he'd want them ironed, if they weren't ironed he'd do it himself but, you know, he has enough work he's doing, like that's my job to do that, so." (IE33, ELL1)

In households that had older children, they were encouraged to play a role in the laundry which normally involved them putting their clothes into the laundry basket (IE32, IE15). In some households where both the male and the female worked responsibility for putting on the laundry was often shared (IE01).

"You know the jeans could be there and I'd just say, oh throw them into the wash do you know. So I kind of make the decision for him and then (middle son) just leaves his clothes on the floor. So I just pick them up and put them in the wash. And then (oldest daughter) puts her clothes in the wash …" (IE06, ELL1)

"I would say every night before we go to bed one of us usually fills the washing machine with something, we'll take, you know, we have our laundry basket is out by the washing machine and one of us will probably look and notice that it's full and put on a wash, simple as that." (IE01, ELL1)

Most of the Irish ELL participants determined when items need to be washed on the basis of length of wear (71%), although smell (18%) or stains (12%) were also common criteria especially in households with young children. For bedlinen, criteria for washing was length of use with most households saying that they washed their sheets every week or every two weeks. One participant washed her tops after every wear regardless of whether they were dirty or not because she felt they would be dirty:

"I'd always check my trousers, because I wear kind of light colours. And the top, yea I'd change the top as well, yea, I will change my top. My trousers I might go maybe two days. But my top I'd always change. I work in a very hot building, if it's summer; we've no air conditioning, the heating's through the roof. So yea it'd be very hot." (IE11, ELL1)

Several participants stated that they used all criteria with seeing a full wash basket a common incentive for putting on a wash. Several participants spoke about not liking to see a full wash basket and feeling that it should be empty as much as possible. Most families with small children spoke about the high volume of washing they have as a result of having infants or young children (IE01, IE09, IE20 and IE33).

"And now sometimes washes do go on during the day if say baby gets sick on the duvet or something, you might be putting on a white's wash in the middle of the day because we only have one set of sheets for our bed." (IE01, ELL1)

"Yeah. I remember when we first had (oldest daughter) and if there was like that much of poo on a vest I'd be like oh my God there's poo on her vest. It would have to go in (to the wash)." (IE20, ELL1)

"As you have more children you've a lot more clothes. And I think when they're babies you've a lot of washing. Like you have the baby gros and you know yourself, the vests and there's lots of little bits, you know. And then there's puke and there's you know pooh and the whole lot." (IE09, ELL1)

One participant also spoke about using blankets to cover her sofa for her dog to sit on and that she washed this regularly. Several participants stated that they didn't had a routine around their washing, particularly those that were at home full time. The time of year also influenced washing routines, with longer days and dry weather being cited as important factors. These participants routinely stated that is the weather was nice they tended to put on a load of laundry to make use of the "drying weather":

"Umm… I think about the same. It depends on the weather you know. During the summertime everything goes out on the clothes line really and truly you know. This time of year umm… You know I suppose this time of year when the heaters are on now you know a lot of clothes would be just put on the heaters you know." (IE16, ELL1)

"Oh I could do it any time. I could be doing it at half 8 at night-time. Sometimes I put it in at night-time maybe half 8 or whatever, 8 o'clock or 7 o'clock and I would have it. I would take it out of the machine when it's done and I'd leave it in the basket and hang it up in the morning. This time of year especially when you know the evenings are getting shorter. In the summertime I could do a wash any time and you know you can leave it out overnight. Umm… I've no routine. It's just random when the basket fills up then I wash." (IE12, ELL1)

Many participants also spoke about how travelling or having family visit also increased their amount of laundry. Participants spoke about how their adult children returned with washing from university, and how these visits increased the amount of laundry in their household:

"And if my daughter is home or my son. He's married and he has a child. So if they come you know it's the same. The washing machine is used a lot more frequently than when just the two of us are here in the house. And you know the way sometimes then there's extra things you wash. Maybe a duvet may need to be washed or you know maybe some kind of a blanket that you're using you know so they need to be washed. So they're all extra. They would be extra from the routine that you're used to." (IE12, ELL1)

"Oh yeah. He'd have his. Not that much but he'd have his week's wash to be done before he goes back on Sunday … But it's less than two washes really. You just throw them in with the uniforms and that you know. So it might only even be one extra wash." (IE31, ELL1)

Many households discussed how their laundry routine centred around the need to have their children's uniforms clean for school on Monday:

"Like I would, I'd have uniforms for them and they might have two jumpers and that's it, there's now washing them during the week, if it's dirty you go into school and wear it, they might wear the same jumper five days a week, you know, I'm not too worried but if it's dirty on a Wednesday I'll throw it in the wash but they just, all the uniforms get washed at the end (of the week) and they're generally all dirty …" (IE22, ELL1)

In Ireland, shared laundry machines are not common, particularly outside of apartment blocks. ELL participants lived in both detached or semi-detached houses, and they all owned private machines. The number of weekly laundry cycles washed by households varied from 1 to 17, with an average of 6.7 cycles per week (Table 8). Half of households used the dryer regularly and 68% of households tended to iron regularly, but not for long periods.

Table 8. Reported laundry practices in households before participating in the ENERGISE challenges (n=34)
Source: baseline survey.

Average number of laundry cycles	6.7
Share using dryer regularly, %	50%
Share ironing regularly, %	68%

Most households had newer washing machines that allowed them to wash at lower temperatures. Households most commonly washed their clothing at 40°C or 60°C and bedlinen at 60°C. However, there was a relatively large variation (Table 9). Many households mainly used only one or a few of the existing programs in their washing machine and tended to wash by program rather than temperature. Some participants spoke about how they washed their work clothes or sports clothes at 60°C as they felt that clothes that smell needed to be washed at higher temperatures. Participants also stated that they automatically put sports clothes into the wash without checking to see could they wear them again:

*"The most is sports gear to be honest and towels, yea … Well the sports gear would be manky anyway." (*IE11, ELL1)

Many households separated colours (light from dark) before washing and washed their sheets and their towels separately and at higher temperatures. Some households (particularly those with small children) used a stain remover to treat stubborn stains.

Table 9 Reported washing temperatures among the ELL participants before participating in the ENERGISE challenges (n=34)
Source: baseline survey

	Mode	**Mean**	**Lowest**	**Highest**

White clothing, °C	40	46	30	90
Dark clothing, °C	40	40	30	90
Bedlinen, °C	60	49	30	90

The baseline survey revealed that almost half of households (47%) didn't have any other methods apart from laundering their clothes for keeping them clean. Other households employed several different methods to keep their clothes clean before laundering them. Among these were airing out clothes (15% of respondents did this), washing out stains (26%), preventing stains by protecting clothing (29%) and brushing out stains (15%). In our interviews, several participants mentioned changing out of their work-wear when arriving home, and having separate clothing for "dirty" activities (gardening, repairs):

"And also for gardening we both have this kind of repellent proof outer gear. They're like umm, they're not golf, not leggings. What do you call them? Wet wear. They're repellent. So in the winter if I'm gardening or doing and it would be mucky out there anyway. I always find something to do. I would wear those clothes and they just wipe off." (IE29, ELL1)

"I might wear the same clothes two days in a row, like I wore this yesterday, it's got a few, there's some avocado on it, but I don't mind because I'm at home and it's not like I'm in the workplace, so I don't mind having kind of dirty clothes, but if I was going to work if there was any kind of thing I'd probably be putting my clothes in to the wash every night." (IE01, ELL1)

Most participants had a place for clothes that they had worn but that weren't dirty. Many stated that they hung these on hangers or over chairs and others said that they put them back into their wardrobe.

"So it's always wardrobes and they have shelves like that as well . Although sometimes they can get piled up on a chair, you could have four outfits from the week and then I've to hang them all up. (IE03, ELL1)

Two households had very innovative ways to dry their laundry having bought clothes airers and installed them above their hot water tanks or in areas where underfloor heating could easily dry them (Pictures 11, 12, 13 and 14).

Picture 11: Innovative solution for drying clothes inside, underfloor heating and MHRV

Picture 12: Innovative solution for laundry storage in dedicated laundry space

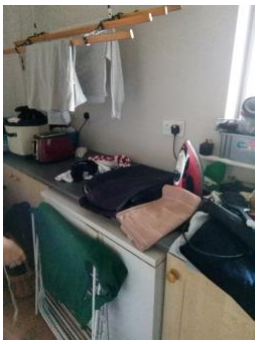
Picture 13: Innovative solution for drying clothes inside a home with MHRV

Picture 14: Innovative solution for laundry storage under stairs

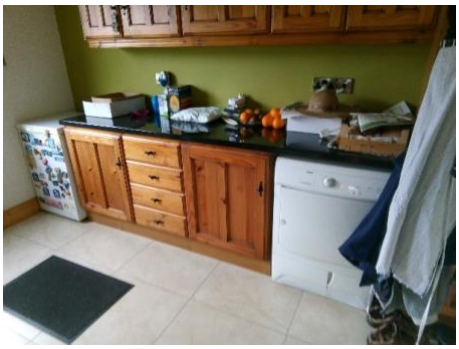
All participants were happy with their laundry facilities and stated that they were easy to use. Several participants had utility rooms with a designated space for doing laundry. Participants also discussed their concerns over drying clothes inside and incidence of dampness in buildings. Those with mechanical heat recovery ventilation systems and utility rooms were more comfortable drying their clothes inside and had designated spaces in their houses for doing so (Pictures 15, 16, 17 and 18).

Picture 15: Example of layout of washing machine and dryer in kitchen

Picture 16: Example of utility space with dedicated drying area



Picture 17: Example of utility space with dedicated drying area



Picture 18: Example of utility space with dedicated drying area

Several participant admitted that they tended to use the same program/ temperature all of the time and that they did not know any of the other buttons on the machine. A large proportion of participants stated that they either didn't know whether there was an eco-button or that they didn't use the eco-button. Only three participants stated that they use the eco-button, and several participants stated that they were confused as to whether the eco-button saved water, energy or both. Four participants also stated that they were surprised to see, when recording the meter data, how little energy the washing machine used.

P1: "I was trying to look for that during the week. I don't think I do."
P2 "Sure I don't (P2)?
P1: "I don't know." (IE11, ELL1)

Participants were also unsure of the function of the eco-button and cited concerns over a reduction of temperature:

"I really don't know, I've never even considered the eco wash, I just, I suppose I would just think the clothes I'm putting in at the moment, with (baby daughter) doing her weaning, like her clothes are covered in food, they, you know, and I'm soaking clothes before so that, you know, stains will come out, but, yeah, I find I'm washing clothes and (baby daughter's) clothes would still come out with traces of food on them, so I'd be kind of sceptical of the eco wash." (IE01, ELL1)

"Now that you're asking me, no I do not understand that washing machine. And I never spent the time reading the instructions and that's the truth." (IE10, ELL1)

"It doesn't have an eco-button but I looked and there's an eco-setting … So I haven't, I don't know, I'll always run the dishwasher on eco but I'm not running the washing machine because I don't think it'll wash the clothes properly." (IE33, ELL1)

Participants rarely discussed the use of detergent and it wasn't a concern for them in general. However, two participant spoke at length about their concerns about using detergent and a desire to use natural products.

"Well it is when you have a load of chemicals to put into your wash, like you know, you can, like I try to use a minimum chemicals in the house but I know if I just threw in loads of those stain things you do get white clothes with them." (IE33, ELL1)

Another explained that these concerns led to her making her own detergent saying:

"I watched where this woman tried all these experiments. She wasn't a scientist but she put in loads of detergent, different kinds, soiled clothes, not soiled, this that and the other. It made no difference. And then she used no detergent and then over a good period of time and she came to the conclusion that the detergent, it was the agitation in the machine that did all the work and the detergent was just for a nice smell. So then she came up with propositions to make your own which I have done. And I follow that for the last two years … I buy the base and I make my own mixes depending on the different kinds of smells I want. Like I would use essential oils and I use vinegar and I use baking powder and I use castile soap as my base." (IE29, ELL1)

Several participants stated that they liked having clean clothes and that they felt it was very easy and important to have clean clothes all of the time:

"Yeah that would work for me now because that's the way I'd be thinking of clothes. You know I would have had that. I would just feel that they should be clean and nice and fresh" (IE23, ELL1)

"I think it's easy but you need to have a strategy about it so I would always do my whites all whites together I wouldn't mix anything and if it sometimes I would use all white brilliant white sachets or I would buy "Vanish" (stain remover) is very good for whites. Or sometimes if there was a particular nice white thing I might soak it yes." (IE25, ELL1)

Participants that felt it was easy to have clean clothes either didn't have young children in them or were not responsible for cleaning the clothes of the children. Participants in households with young children stated that they liked the idea of clean clothes all of the time but that it was very difficult to achieve:

"Well I wouldn't really agree with it because we are kind of an outside outdoorsy family and I think you need to have a little bit of muck and dirt to build up your immunity. And I know the science world would try and sell you products so there'll be no bacteria and everything but I think we have a different approach." (IE05, ELL2)

Some participants even spoke about how clean clothes sparks and emotional reaction in them, with clean washing making them happy:

"I still think you should be clean. You see because I was a nurse as well I would be big into germs and you know you should be clean. Like it's… And as I said a clean line of washing makes me feel really happy. It is definitely a lot of the mother and the whites. Like I've heard my mother say stuff like I can't believe she'd hang out that white washing on the line and not be too embarrassed that that's her whites. You know so… Yeah do we have to be spotless? I don't know. Like I find that very challenging to be not clean." (IE26, ELL2)

Other participants also spoke about how expectations of hygiene and cleanliness had changed over time, and felt that this had an impact on expectations of how clean clothes should be:

"You have to do your own thing if you're strong enough, and I think that comes with age, too…it's the younger generation that's with social media driven crazy, it's perfect, everything's so perfect, you talk about white teeth, whitening teeth become the phenomenon." (IE14, ELL2)

"It's just it's a necessary evil I suppose as well, sure we have to have clean clothes. We live in a civilised society, but maybe we, I don't know. Maybe we do too much of it I don't know." (IE11, ELL1)

Many households with young children also spoke about how they select clothes so as to reduce the amount of whites they are using:

"I don't tend to have much white clothes for my kids because it's not a good idea (laughs)." (IE33, ELL1)

When asked about their feelings about laundry and the amount of laundry they had to do, most participants stated that they felt there was always washing to do. Participants also spoke about how they linked the weather with laundry and that it meant they thought about the laundry a lot:

"That's all we think about – nice day, washing, out on the line…that's all we think of. The men don't have to think of that you see" (IE36, ELL2)

Most of the participants felt that the laundry was a chore that took up too much time and were keen to reduce the amount of laundry they were doing. Several also stated that they had never thought about doing the laundry before and were surprised by how much time they spent doing it:

"I'm actually surprised when I calculated it. Yeah. It's too much. Life's too short. A half a day. A half a working day. That's too much." (IE07, ELL2)

Interestingly, one participant spoke about how she enjoyed doing the laundry. Having previously worked full-time, she had recently started to work part-time so she could have more time at home. This was reflected in her perspective of laundry with her describing how fortunate she felt to be in a position to care for her young children:

"Well I, I suppose it's your perspective and it could be like a complete drag and burden and oh my God it is never-ending and I have to do all this but also like it's like, you know, I have five people that I get to care for and I am trusted with their care and their food and their upkeep and like it's lovely that, you know, I'm the one who does that for them so that's a complete, just it depends and I like to try and think of it like that, that that's my role for them that I care for them and take pride in giving them clean clothes and have a nice home and so it's just about, you know, if you get into the whole oh God I have to do all this now and it's total drudgery, you know, and I think as women we're made to feel that everything that's got to do with the home is drudgery and, you know, we shouldn't have to do it." (IE33, ELL1)

For those that felt they were doing too much laundry, the estimates of time spent doing the laundry ranged from an hour a week to 4 hours a week.

3. PRACTICES DURING AND DIRECTLY AFTER THE CHALLENGES (FROM WEEKLY AND EXIT PHASE)

This section describes the changes that occurred in the households participating in the Irish ELLs during and directly after the heating and laundry challenges. These challenges were to reduce indoor temperatures to 18°C, or determine an individual challenge, as well as to cut the number of laundry cycles by half, or determine an individual laundry challenge. Table 10 shows the share of households signing up to the common challenge, and provides examples of individually defined challenges.

In ELL1, all but 4 participants signed up to the general targets set out by the ENERGISE team (reducing temperatures to 18$_o$C, halving the number of laundry cycles and reducing the temperature of laundry cycles). In ELL1 there were several participants (16%) who already had their room temperatures and temperature of laundry cycles at these targets, so they chose other challenges, for example trying to reduce their temperatures. Only one household signed up to the general target for one domain (laundry or heating) and created their own targets for the other.

Households were more inclined to sign up to the common challenge when they were part of ELL2 rather than ELL1, perhaps because of the community aspect of the challenge. 95% of participants in ELL2 signed up to the general heating challenge in comparison to 80% of households in ELL1. 83% of households in ELL2 signed up to the general laundry challenge in comparison with 75% of households in ELL1 (Table 10). Most participants with a fireplace or a stove (64%) stated that they felt it would be difficult to reach the target of reducing their heating to 18$_{o}$C in the living space but said that they would try to manage the fluctuations in temperature as a result of the fire by putting on smaller amounts of fuel in at more regular intervals. Two households with children under 14 (IE05 and IE14) felt that they were efficient enough with their laundry already and felt that because of the children they wouldn't be able to reduce it by much more.

Table 10. Share of households signing up for common or/and individual challenges
Source: interviews and closing survey

	Common challenge, % households signing up	**Individual challenge, % of households selecting an individual challenge**	**Examples of individual challenges**
Heating challenge	ELL1: 16 households, 80% ELL2: 17 households, 95%	ELL1: 4 households, 20% ELL2: 1 household, 5%	Different temperatures upstairs and downstairs Smaller reductions (e.g. 19°C)
Laundry challenge	ELL1: 15[1] households, 75% ELL2: 15[2] households, 83%	ELL1: 4 households, 20% ELL2: 1 household, 5%	Reducing by a third or a quarter Reducing the temperature Doing fuller loads

In the following, we first discuss the changes in heating practices, and then discuss changes in laundry practices. The data for this section is derived from a weekly survey sent to households, a concluding survey directly sent after the end of the challenges, as well as a closing interview (ELL1) or focus group discussion (ELL2). Indoor temperatures were monitored with a temperature logger and electricity use for laundry machines (washing machine and dryer, if used) with a power meter.

3.1 CHANGES IN HEATING PRACTICES

The heating challenge started on the 12$_{th}$ of November 2018 in the Irish ELL households. Figure 1 presents differences in indoor temperatures, based on temperature logger data from the participants' living rooms, during the baseline period (October 1$_{th}$ to November 12$_{th}$) and during the challenge period (November 12$_{th}$ to December 9$_{th}$). There were slight changes in living room temperatures in both ELL1 and ELL2 resulting in slightly lowered temperatures in the living room -

[1] One participant in ELL1 did not take part in the follow-up interview or complete the closing survey
[2] Two participants in ELL2 did not complete the closing survey

0.04. Several participants in ELL2 referenced the unusually mild weather during the baseline period as a factor in the slight increase in living room temperature, stating that the temperatures recorded in the baseline data was not reflective of typical rooms temperatures at that time of year. Interestingly less households signed up to the common challenge in ELL1 than ELL2, yet these households achieved slightly lower average temperatures (19.3$_0$C) than households in ELL2 (20$_0$C). As previously discussed in section 1.2, the weather was unusually mild during the baseline period, and few households had turned on their heating, which may have led to a heating baseline that was not fully representative of typical temperatures during heating season in the participating households.

The average reduction for the entire sample of participants was 0.3 °C. Due to the use of stoves and fireplaces as secondary sources of heat in the households, most of the reduction is due to actions taken by our participants and not as a result of falling outdoor temperatures (see more details in Annex 2).

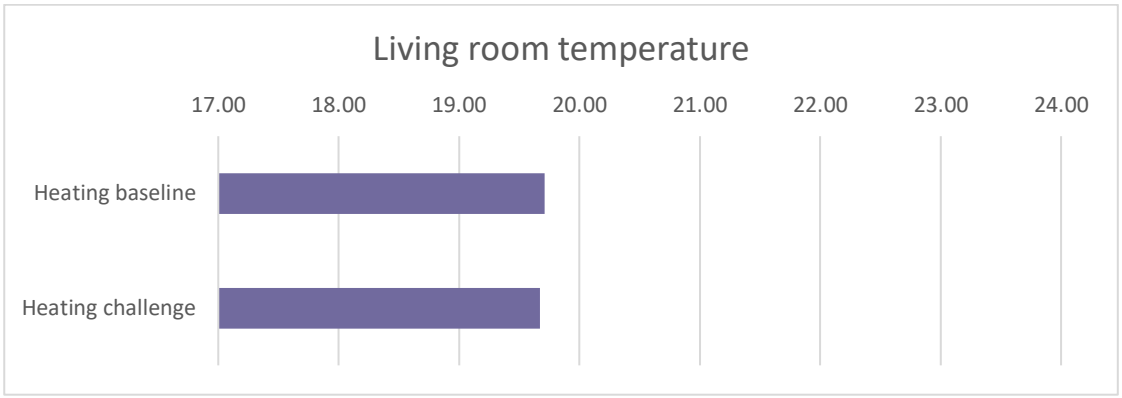


Figure 1. Reported changes in indoor temperatures before and after the heating challenge (starting November 12$_{th}$). Source: weekly surveys

For most households in the Irish ELLs the challenge included a reduction in the indoor temperature, but there were several households in both ELL1 and ELL2 that already had low temperatures and the heating targets were not very challenging for them. Most households said that because of the challenge and the discussion during the deliberation interviews that they paid more attention to the temperature and stopped to think about turning up the heating before doing so. Most of the participants had relatively large houses (80% greater than 140m$_2$) and as a result of the challenge they started to turn off heating in rooms that were not being used to save energy. One participant consciously turned down the heating in rooms that were not being used, but was unwilling to turn it off completely:

*"From the heating yes what I did was like we have bedrooms that are not being used at the moment and the heating the rads they are on the whole time but and they would have been up fairly high you know… yes so I just I put it at one and reduce it turn it down from five to one" (*IE12, ELL1)

Another participant who lives in a relatively small house by Irish standards said that as a result of the challenge he started to open the doors of the living space when the stove was on to heat up the rest of the house:

"We would I suppose keeping the doors closed is a big thing anyway with us. You know we would have done that. That door is nearly always shut. It's nearly always shut you know. Umm… with these doors here leaving out the heat was a big thing as well you know. Because what we found beforehand when we were in there the doors were closed and the heat was confined in there to where we were sitting. Now we're opening doors leaving the heat to spread out." (IE20, ELL1)

Two households did not take part in the heating challenge because they had heat pumps and underfloor heating and they felt that their energy use for heating was very low and takes a long time to manage the temperature making it difficult for them to change it. However, two other households that had heat pumps (one with underfloor heating, one without) took part in the challenge and tried to reduce their temperatures to 18$_o$C using similar practices to other households in the Irish ELLs. One participant spoke about how it took a long time for his house to heat up and previously he would have kept it at 21$_o$C and worn less clothes. However, when he took part in the challenge he set his temperature to 18$_o$C and, rather than turning up the temperature, put on more clothes:
"Realising that the house isn't going to warm up. If I was gonna watch TV putting an extra blanket or whatever." (IE21, ELL2)

He spoke about how visitors reacted positively to the challenge and that he felt that they were more comfortable in the house at lower temperatures:

"I kept the challenge up because most of my friends would come into the house and actually start peeling off clothes and ask me to open the windows because they think it's too hot here … They're normally sweating. They think it's great now. It's cosy. It's fine." (IE21, ELL2)

Most participants (67%) heated their homes with oil-fired central heating. As a result they had a significant amount of control over their temperatures throughout the house. Those that had a stove or fireplace as a supplemental heat source for their living space found the temperature more difficult to regulate. One participant spoke about how she reduced the temperature in their living space significantly. She said in her deliberation interview that she had reduced it from 24$_o$C before the baseline period to 21$_o$C during the baseline period saying that now she was aware of the high temperature she couldn't keep the house at that temperature. She also spoke about how the GroEgg had been lighting red, showing that the room was above 24$_o$C all of the time. She said that prior to the deliberation interview she would have thought that was a comfortable indoor temperature, but after the deliberation interview she began to think differently about her thermal comfort levels:

"Yea this would've been always on red; you know it would've been red. I would've thought red was good. That's the way it should be …. " (*IE05, ELL2)*

But having taken part in the deliberation interview and the challenge, she explained that her expectation of indoor temperature had changed and that now she puts on a dressing gown to stay warm at night and has begun to get used to the lower temperatures:

"Yea just an extra layer or two. Like I'd wear my dressing gown a lot more now in the evenings and stuff, if I'm feeling cold. But I think it's just acclimatising and I'm used to it now." (IE05, ELL1)

Other participants spoke about comfortable temperatures being "what they were used to" and felt that it was just a matter of adjusting to new lower temperatures over time:

"But I think I've lowered it down because I just got used to it. Because if I moved in next door with the lovely heat I'd just get used to that. You know it's just what you're used to." (IE33, ELL1)

Other participants also spoke about new methods they had developed of keeping warm at lower temperatures and as a result were putting on their heating for less time during the day. Some spoke about using blankets, jumpers, hot drinks and even drinking "hot whiskeys" (an Irish drink of hot water, whiskey, sugar, lemon and cloves) to stay warm:

"Ah yea I suppose I'd stick on a hoodie if it's, I mean if it's cold. I mean again we don't put on the heating during the day. So it's only in the evening time and we also light the fires. So there's no heating on literally only a couple of hours in the evening time. If you're cold put on a hoodie, but I wouldn't light the fire." (IE11, ELL1)

"I never used a blanket before and I'm getting into it" (IE22, ELL2)

"Ummm… Maybe I shouldn't have but we did have a few hot whiskeys!" (IE25, ELL1)

More participants spoke of other ways of keeping warm rather than increasing the temperature including doing more exercise and two participants said that they coped with the lower temperatures by going to bed earlier because they tended to get colder when they were tired.

"I have the cup of teas or the herbal teas. I would know that if I went… You know maybe once a week I would go for a big long walk with friends and you know I'd know I'd be heated for the day then because I've had a lot of exercise. Yeah I think I just wore more clothes. If I was getting cool, you know if I was getting a bit cold I'd have a cup of tea or something." (IE33, ELL1)

"Going to bed a bit earlier." (IE28, ELL2)

Several participants talked about the tips in the ENERGISE leaflet and how, although they previously knew of these ways of keeping warm, had not done them routinely. One participant in particular said that she had fluffy socks that she would routinely put on in the evenings when she got cold and others in her household didn't. She explained that she had never realized that this was possibly because she felt the cold more than her husband and son:

"I actually have my own set of fluffy socks that I always would put on in the evenings and my own dressing gown. So I didn't change any of them. I thought it was interesting that you would say to warm up the person rather than warm up the room. I obviously was doing that and didn't realise that's what I was doing because I like more heat than the others." (IE15, ELL1)

When asked, no participant said that they use hot showers to keep warm unless they had gotten wet while outside. Most participants spoke about how they felt that others' houses were either warmer or cooler than their homes and several discussed how they felt that comfort was something that was based on individual preferences. They stated that when they made the decision to lower temperatures that they would become more comfortable with them over time:

"Yeah I think it's just you know what you're used to. You just get used to a heat. Like if I go into the neighbour's house it's roasting. I really don't like it. Well not necessarily that I don't like it. It's lovely and warm but I wouldn't be able to stay in it." (IE33, ELL1)

Another participant spoke about how students he had staying at his home had different perceptions of thermal comfort the him and his family:

" … the student from South of France: But when we're outside even it was still warmish, well to me it was warmish, but she was wrapped up like a polar bear. So they're probably watching. You know when she was on the trampoline she was all zipped up and the kids were going around in shorts like and t-shirts." (IE16, ELL1)

Most participants spoke about their desire to reduce their energy bills and their hopes that taking part in the challenge might do this. Two participants with quite different heating systems (oil-fired central heating and a heat pump with MHRV and under floor heating) spoke about how reducing their indoor temperature to 18$_{o}$C led to significant cost savings on their energy bills:
"Our oil, like we would have been getting and oil fill every month. And we're getting it about every two months now … because we were spending about four grand on oil a year." (IE05, ELL2)

Picture 19: Example of changes in material arrangements

Most participants stated that they made no changes in material arrangements to help them achieve their heating targets. However, two participants spoke about they started to use rooms differently to make most efficient use out of their heating as a result of the challenge. One participant explained that she has moved a sofa so that her husband can watch television in an adjoining room to the stove so that she doesn't have to heat up another room. Another participant spoke about how they now use upstairs in their house more in the evenings for leisure activities for her children so that all the family can be upstairs when she is cleaning and putting the younger children to bed.

"If the stove is lighting in the evening and the egg is anywhere approaching the red it's just too warm for (husband). So I've kicked him out and I leave the double doors open and he'll watch the TV sitting in the armchair in here. And I'll wallow in the heat and I can watch my own TV. He's wearing headphones so there's no crossover of sound or whatever. And it's far more comfortable." (IE15, ELL1)

"And then upstairs we've started to use the study a tiny bit more. Because there's a TV in it and we brought a little kind of day bed in there for the kids. So they can lie on that and watch the TV. So I might be working away and doing stuff so, I suppose we hang out there, or else just go to sleep. I suppose we're using upstairs more, just for sleep in the bedrooms say. But it is a lot easier just to heat upstairs, you know because it's a smaller area. So and we decided we'd turn off the heating downstairs about an hour before we go to bed. And we've got kind of better bedtime routines and stuff." (IE05, ELL2)

Temperatures that the participants felt comfortable at ranged from 18.5$_{o}$C to 21$_{o}$C, with 4 out of the 11 participants feeling that 21$_{o}$C was most comfortable. Those that maintained their living room temperatures were either 50 years old or older and felt more comfortable at higher temperatures (7 out of 11 participants) or had stoves that they found difficult to control the temperature with (4 out of 11 participants):

"Because I know I suppose when my sister and I sat down watching a film or something. We began to feel quite cold … But then I'm thinking ahead, I'm sixty, when I retire I will probably be inactive more and more as I get older. So I could see it being a huge issue for elderly people, the inactivity." (IE03, ELL1)

"We got on well but we found 18 degrees was just too cold. We did try it but it just kind of coincided with a less mild period I'd say and the house did feel quite cold for a day or two. So it went back up but what I had done initially was I had dropped from 23 to 21, because at night time as I said I had it on at 23 at night so I had dropped that initially when I knew it was going to fall to 18. So we had dropped to 21 that was very comfortable and very, just even a nicer feeling in the house because it wasn't as warm some days. So it was quite nice. But then when we dropped down to the 18 it was just that too much, it was too cold. And we just felt, it was fine we had the fire but then the other rooms in the house felt like really cold. It was uncomfortably cold." (IE09, ELL1)

Several participants spoke about how acceptable thermal comfort levels in their homes was perceived by different household members. Several households containing an adult male and a female spoke about how when one was comfortable the other one was not. For example in one household with an adult female, male and 3 children, the female controlled the temperature of the central heating, and she explained that quite often her husband and children would be complaining that it was too warm:

"Oh no he (husband) would open windows and turn it off and he used to feel faint sometimes it was so warm. (Laughs) … No, sometimes the kids still take their jumpers off, like so they're warm enough you know … Yea he's definitely a lot happier, because he just says; it's so uncomfortable for him, like he wouldn't like the heat. He'd feel nauseous and dizzy and want to just lie down." (IE05, ELL2)

Another participant spoke about how taking part in the challenge helped with the different expectations of thermal comfort in their home. He spoke about how prior to the challenge his wife would routinely complain about the temperature and that it was too cold. He explained that since taking part in the challenge he was delighted that rather than complain she now puts on a jumper:

"And (wife) would have in the past complained about being cold. But she hasn't now I don't know if that's the effect of this … yea she's not complaining of the cold at all, yea, so … yea it would be a regular thing every day, saying it's a bit cold in here." (IE01, ELL1)

3.2 CHANGES IN LAUNDRY PRACTICES

Most participants in the ELLs managed to reduce their number of laundry cycles and participants across both ELLs reduced their number of laundry cycles by 31% during the challenge period (Figure 2).

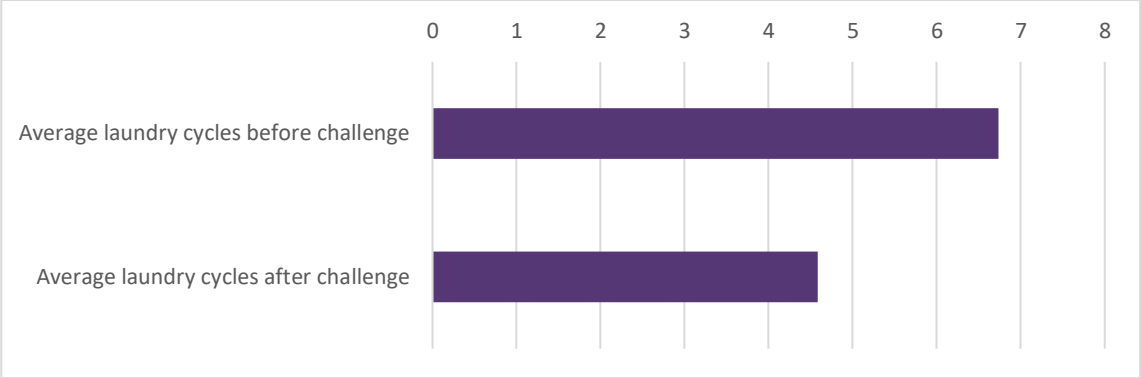


Figure 2: Number of laundry cycles washed during baseline and challenge periods.
Source: baseline and closing surveys.

Not all participants selected the common laundry challenge for various reasons (such as a new baby or the need to have clean clothes at work or because they were already doing very few washes or because of allergies among household members). 75% of participants in ELL1 selected the common challenge and 83% of participants in ELL2. Those that had been washing every day or that washed by length of wear reduced their laundry by the most. Those that did 4 or less washes per week found reducing the number of washes they do the most challenging (IE25). One of the participants (IE01) didn't try using the eco-programme, as she did not want to compromise the hygiene of her baby, and as her baby was feeding herself she felt her clothes were too dirty to get clean on a lower temperature. Some participants felt that they were already doing very few washes and that they couldn't reduce the number during the challenge. These tended to be households that had children under 14 years of age (IE14, IE33). One participant spoke about how difficult it was to get her children to reduce their laundry, and that the weekly routine of uniforms and sports makes it very difficult to reduce the amount of laundry. Both participants said that they began to feel demotivated with the study as a result:

"And you're like I'm not interested. And I was saying to my husband I was like God I don't think I'll do this now, you know, this is really annoying. And he was like; the weather's completely changed, there's more activities … Its funny when you set yourself a task even I knew all these and you're still falling short you do feel bad like. So I think be very careful about what you're setting people up for because they get really… You know you get demotivated by starting off on the back foot like." IE33 ELL1

Another participant felt that the challenge was a good idea and that if a household had a lot of laundry that they would really enjoy it, but they felt that it was too difficult for them to reduce their laundry:

"I suppose if you had cut down on your washes then you would notice a difference but because we were kind of fairly efficient with the washing anyway." (IE14, ELL1)

The reduction in the number of laundry cycles was greater in ELL2 than ELL1. As ELL2 was part of the community of place group, and enlisted through the school, in general families were younger and had more children and teenagers in their households. Fewer households in ELL1 signed up to the common challenge as 40% of those households were doing 4 washes or less per week, making reducing the number of cycles more difficult.

Figure 3: Number of laundry cycles washed during baseline and challenge periods; top: ELL1, bottom: ELL2. Source: weekly surveys

Table 11 shows how the changes in laundry practices are reflected in changes in electricity consumption for laundry appliances. It is important to note, however, that power consumption might also be influenced by the external temperature, since more energy is required to heat up colder water. Additionally, energy was saved due to reduced ironing.

Table 11: Weekly electricity consumption for laundry appliances during baseline and challenge periods. Source: laundry diaries.

Power consumption for laundry appliances, kWh/week	Mean	Lowest	Highest
Baseline	3.17 kWh	0.665 kWh	22.16 kWh
Challenge	3.81 kWh	1.206 kWh	40.72 kWh

Several participants spoke about how they felt that there had been shift in perceptions of laundry among the members of their households. One participant in particular spoke about how the challenge helped her to encourage her teenage children to think about their laundry and to try to get more wears out of clothes. She felt that the change was significant and that she now sometimes had to tell them something was dirty and needed to be washed:

"They've (her teens) changed totally almost to the point where 'are you ever going to wash that?'"
IE26 ELL2

While another participant reflected that prior to the challenge they tended to put items into the wash basket out of habit and were not very mindful of their laundry habits:

"You know we were putting something in the wash for the sake of it you know. We didn't need to wash as much as we used to." (IE13, ELL1)

Several participants also spoke at length about their dislike of full washing baskets and the urge to need to empty the washing basket as soon as possible. Many discussed how they found it difficult to wait for the baskets to be fuller so that they could put on a larger load. Two participants in particular spoke about how they had to stop themselves from automatically doing a wash when the washing basket started to fill up and how, although they spent less time doing the laundry, they felt they were thinking about it more:

"I found it ummm… I had to think about it. Normally once I go into the utility and there's clothes there I would just automatically clear them. Within reason. If I had three quarters of a load I'd bang it off. Whereas then I found that I was pushing it off for a few days so that I had a much fuller load. Now that would have been a big change (IE25, ELL1)

"You did actually have to think more about it, yea. And I had to stop myself from doing a wash, even though it suited me on that day to do it. And because I had the drying space, but then because it was. I was thinking exactly the amount; I wasn't thinking any less about it." (IE02, ELL1)

Participants also discussed how their laundry routines were impacted by the routines of their children. In Ireland, because laundry is traditionally a private practice and shared laundry appliances are uncommon, third level students often bring their laundry to their parents' house when visiting at the weekend. Several participants spoke about how this meant that when they were expecting their adult children to return from university that they would try to have their wash baskets empty, ready for their clothes, but that taking part in the challenge prompted them to change this routine:

"… because (my son) often comes down at the weekend. And I suppose over the years you cleared everything before they came at the weekend so that it was clear for their laundry. Whereas now I tended to carry it over. And I definitely tried to make up a fuller load." (IE25, ELL1)

Most participants stated that the largest change in their practices around laundry was to wear their clothes for longer.

"I used to wash my pants every night, for work like. and there's no need, because I sit a lot and yea, I'm going ah I'll leave that there and I'll do that, I'll wear that again maybe on Wednesday. And just leave it there I won't bother washing it. And then just wear it on Wednesday and wear something else Tuesday, you know cheat that way." (IE11, ELL1)

"And the other thing I really found great was airing the clothes without washing them. Like woollen clothes and outer wear. I did that quite a lot and I was thrilled with it. Like scarves that I used to wash and other clothes. Amazing how fresh they became and even lasted freshness you know. That was a big plus. Yeah." (IE29, ELL1)

"And maybe leaving the sheets on another week, or turning them top to tail." (IE02, ELL2)

Several participants spoke about how, during the challenge, they started to use different techniques to assess whether an item was dirty. This change in practices was both in households that did a relatively small amount of laundry and those that did a large amount of laundry. For example one participant (a police officer) explained that their household did on average 14 washes a week during the baseline period, said that he now made the decision on whether something needed washing on the basis of smell rather than length of wear:
"Well if I'm wearing a t shirt for the second day, I'd air it overnight. And I'd have a good smell of it to make sure it was fine before I'd wear it for a second day. As I say I work in close confinement with other people. So they wouldn't be long in letting me know." (IE11, ELL1)

Another participant spoke about how she changed her routine for her bedlinen and rather than automatically doing it every week, she would look to see if it was dirty and got more use of the sheets:

"So I am prolonging everything a little bit longer now than what I used to you know before I just changed clothes bed clothes and that was it. Whereas now I would look at it and know that I could get another few days out of that the same with my clothes I might get another few you know another day or two out of that now." (IE12, ELL1)

Participants also spoke about how trying to reduce the number of washes they were doing per week encouraged them to do bigger loads of washing. Most said that this was a relatively easy practice to change and that it had the greatest impact on reaching their targets for the laundry challenge:

"I suppose the one thing I learnt was to put more in the washing machine. That would definitely have been the bigger, the biggest change." (IE10, ELL1)

Several participants stated that they found the apron in the heating challenge kit very useful and that they routinely used it to protect their clothes during the challenge to protect their clothes:

"Yeah I did, I wore the apron that you gave me. I found that good actually you know for baking and things like that. Because flour does tend to get everywhere. Yeah I did." (IE09, ELL1)

Some participants spoke about changes in their routines around spot washing stains out of clothes. Several spoke about using a wet tea-towel to spot wash stains. Parents of young babies quite commonly discussed their use of baby wipes to clean clothes since they started taking part in the challenge:

"If they could come off, baby wipes will get paint off a wall like, depending on what baby wipes you use." (IE20, ELL1)

Participants with young children cited school uniforms as a major influence over their laundry routine due to the need for clean uniforms on a Monday. Several spoke about how prior to the challenge they would often put small loads on so that they could get the uniforms clean for the next day. One participant spoke about how she started to get her children to change out of and store their uniforms in a special drawer so theat they would stay clean for longer:

"They go into a drawer that's separate from their… So they have their clothes drawers and then I have a little plastic set of three drawers, one for uniforms and one for sport. So they put them back in dirty into that and then they can take them out and wear them for the next day of sports because I'm not cleaning them. Umm… So that worked that they were kept separate from their main clothes because you couldn't be putting dirty clothes back into." (IE33, ELL1)

Other participants spoke about how they used specific clothes for working outside on the farm or working around the house so that they could keep their other clothes cleaner for longer:

"And then I kept work clothes in the shed. So when I was out there working rather than washing every day. I just left them there for whatever number of days I was outside working on the farm. Or working, building the shed." (IE11, ELL1)

"So… And I would be old-fashioned. I would have clothes that I would wear in the house and I would put different ones on then going out. So I wouldn't be over washing my own clothes. Umm… The lads… I don't over wash their clothes I think. I don't really." (IE31, ELL1)

Only one household (IE05) tried to change roles related to laundry. This participant stated that her husband did the wash for one week. She explained that rather than doing a wash every day or every other day, he would wait and do it all at the weekend. She discussed how she wasn't comfortable with doing all the washing on one day:

"That week and I hated it. (Both laugh) That was the Sunday he was like no washing during the week, we'll do it all at the weekend and yea." (IE05, ELL2)

Participants rarely spoke about whether they changed the amount of detergent they used and most focused on the temperature of their washes. One participant explained that she reduced the amount of detergent she was using and that she felt the clothes came out just as clean:

"I don't have an eco-button but I don't put as much detergent in now because I know like I kind of reduced and I said I would try certain I would use less detergent." (IE12, ELL1)

Picture 20: Example of utility space and arrangements of washing machine and dryer

A few households changed material facilities like bought new baskets or airers, but one household in particular bought four wash baskets so that they could organize their laundry by colour. This participant explained that she bought these wash baskets so that all members of the household could take responsibility for their washing and sort it into the right baskets. She also explained that this meant that they were putting on fuller washes as she waited until the baskets were full:

"So also we organised it. So normally I would spend the week, I'd do an odd wash here and there. I'd pepper it throughout the week. And just because I was trying to fill up the laundry baskets. We got four separate laundry baskets instead of the one big one so people separated their laundry more which was probably no harm. So I was waiting for each of those bags to fill. So the laundry was done more at the weekends which is not something I would have done." (IE32, ELL1)

Buying these laundry baskets also meant that they could be sorted by colour so that the laundry routine could be better planned:

"Well all of it. So the big thing for us was the four bags, the four laundry bags. We used to have one big linen laundry basket and everybody used to fire everything in there. And now we have four bags so they sort their clothes themselves so I can plan it a bit more. So I don't just see laundry in the basket and then just wash you know mindlessly. I'll actually say I'm not gonna do a white wash for another day or two. I'm gonna wait until that fills up a bit more." (IE32, ELL1)

Some participants, because they were doing a small amount of laundry, set themselves the target of reducing the amount of ironing they did. One participant in particular explained that prior to the challenge she ironed all items of clothing, including underwear. However, during the challenge she explained that she stopped ironing her underwear in order to reduce the amount of ironing she was doing:

It was to cut down the use of the dryer and to use fuller and less often the actual machine, the washing machine. And yes that has made, I have certainly cut down the dryer by a huge amount. And ironing the underwear, I iron my husband's but not mine put it that way." (IE06, ELL1)

Many participants also spoke about how they felt it was important to have fluffy, soft towels and how they felt that using the dryer was the only way to achieve this. During the challenge several participants, rather than putting the towels in the dryer wet, started the hang them out to dry and then put them into the dryer to "fluff them up":

"Half done, yes, yea. And I only put the towels in, like you suggested put the towels out and then put them in just to fluff them up. Because before the dryer was running for hours. Not so now." (IE06, ELL1)

Participants with pets found the brush in the laundry kit the most useful. Several stated that prior to the challenge they would routinely put clothes with pet hairs into the wash and during the challenge used the brush to prevent this:

"I, yes and I fill up the drum more than I used to and I don't wash, I dab off jumpers or something if there's a stain on, or dog hairs. And I will wipe off or brush off. Before I used to throw it the washing machine that was it. But not so now." (IE06, ELL1)

Most participants stated that they didn't notice any difference between washing at 30$_o$C and 40$_o$C. Generally agree they did feel like they were wearing clean clothes and didn't feel a difference, except IE26 who felt it was difficult perhaps because she used to be a nurse and had to wear a clean uniform (which was inspected) every day:

"I used to think I had to wash my clothes on 40 wash…but there's no difference [in cleanliness]" IE34 ELL2

"It changed my attitude to it [laundry]" (IE28, ELL2)

"To see actually see it down what I'm doing. So it's about three laundries in the week. And I had always been doing it at the 40 degrees unless I was, got the sheets out and that'd be 60. So the challenge was to bring down the ordinary wash, down to 30. Which I did and sure the wash it quite good, the wash is fine. So I'm sticking to the 30 now as my default wash. There are times though when I will wash at 40. You know there's a lot of, if I feel there's a lot of body odour or something. And I'm not satisfied with the 30 as a hot enough wash for that." (IE04, ELL1)

In one household the participants were divided on the use of lower temperatures. The adult male in the house felt that washing at 30$_o$C was acceptable whereas the adult female (who was responsible for washing the baby's clothes) felt that this did not clean clothes properly:

Male participant: *"Well I never see the difference, I never, I wouldn't complain about it. It would make no difference. I'd see them coming out clean, it makes no difference. I don't know if you?"*
Female participant: *"Well see, you see your own clothes coming out clean. But you don't bother with the children's clothes."*
Male participant: *"I don't, yea."*
Female participant: *"And like sometimes, I remember a couple of washes (male participant) put them on at 30 degrees. And some of (baby')s onesies still had Weetabix engrained in them. So I got kind of cranky at that and I refused to do eco-cycle, or 30 degrees like that. (Laughs)"* (IE01, ELL1)

In general participants were not inclined to use the eco-button if they had not done so before the challenge. Most were unsure what it did and felt that it took too long to clean the clothes with one participants saying:

"Well I wouldn't (use the eco button) because it takes about five hours." (IE31, ELL1)

When participants were asked whether they felt clean, all of them stated that they did. However, one participant, although she said she felt clean, explained that she was uncomfortable because, although she didn't feel dirty she didn't feel like her clothes were freshly laundered:

"I didn't feel… Again it's just a thing in my head. I like wearing a fresh clean t-shirt every day and I just didn't feel that. So I did feel okay because I shower anyway. But I suppose I didn't have that freshness. But it really didn't… It wasn't… it wasn't as sinister as I thought it would be." (IE32, ELL1)

For several participants, laundry was closely related to caring for their children and related to their stages of development. Some participants (in particular IE01, IE03 and IE33) spoke about how doing the laundry was part of looking after their children:

"… and then there was the crawling started so she got very dirty, it wasn't just tops that needed washing it was tops and bottoms. And then (son) took up a hobby, he started doing sports in the local thing, so he was dirtying another set of clothes." (IE01, ELL1)

Other changes in practices also included getting more use out towels by leaving them to dry rather than putting them straight into the wash. Two participants in particular spoke about how they started to leave their towels on radiators to dry and encouraged others in their household to do the same:

"I keep saying, once you've showered. You're actually clean so the towel isn't dirty. And I don't use false tan or makeup. So maybe that's a different story for someone else. And you know you'd put it on the radiator just to dry out." (IE10, ELL1)

"One of the things I did was I just got really, really strict on towels and made them use the same towel a few times and hang them upstairs on their radiators and everything. So that did make a huge difference as regards the amount of towel washes." (IE31, ELL1)

Most participants were happy that they took part in the challenge and many said that they felt like they spent less time doing laundry as a result. Others stated that although they may not be spending less time doing laundry that their attitude to laundry changed and that they felt it had become a more positive experience because of the challenge:

"It was a revelation to be honest…it was so much less work. It was really good." (IE08, ELL2)

"I can't say that I can say it reduced the amount of time. I don't know it just wasn't as negative an experience. It was a more positive experience. I just felt it was a positive thing when I'd get it done and it was like that's great that's done now for today. It wasn't building up and I was there going ohh god I have to face that washing now at the weekend. You know that negative feeling towards it. And it wasn't the pressure on me that oh I have to get that laundry done now today. In a rush and trying to get things dry. It was less pressured" (IE09, ELL1)

"Ummm… Well definitely there was more time to ourselves than previously. There was less stuff hanging around the house. Ummm… the place was like a laundrette most of the time you know." (IE20, ELL1)

Everyone felt that the change they made in relation to their laundry habits were easy to continue. Many said that their approach to laundry had changed and that they would be more relaxed about having to wash everything so often while others said that they had kept up the changes in routine and as a result their families didn't know that the challenge had finished:

"Not being so precious about the kids being so clean" (IE08, ELL2)

"I don't think they know it's over." (IE26, ELL2)

3.3. POTENTIAL RUPTURES AND SUFFICIENCY POTENTIAL

There is evidence of moments of ruptures in routines (moments during which practices were destabilised and reconfigured during the ELLs). Several participants (eg. IE05, IE33, IE20) explained how having the GroEgg in their homes glowing different colours according to the temperature and the act of measuring the temperature had a big impact on their routines before the challenge. Several participants spoke about the effectiveness of the GroEgg itself and how the changing colours to signify a temperature rise was a powerful motivation to change their practices, even though they were trying not to for the baseline period:

"But I think just putting a thermometer in the room and seeing it being visual changed my behaviour straight away." (IE33, ELL1)

"It did I would say, yea it just, I suppose we started being more conscious. I know we weren't supposed to start changing behaviour until the challenge itself started. But you would become more conscious of what you're doing. So I suppose it's natural that you would probably improve your behaviour before the actual challenge started you know." (IE11, ELL1)

"Definitely the changing colours they would catch your attention you know … Well it forced you to think about how much you're using, yea. Because if you weren't keeping a note of it, sure you won't be as conscious of it." (IE11, ELL1)

Other participants also spoke about the effectiveness of using electricity metres to measure their energy use and how this caused them to change their behaviour even when they were not trying:
"Well it did when you could see the cost and the kilowatts you know." (IE23, ELL1)

All participants spoke very positively about the GroEgg thermometer and the meters saying they weren't expected but that they supported them in achieving their targets:

"So of all of the things that you gave us the egg and the metre readings were, like, really, really helpful. We weren't expecting it. We weren't expecting anything at all. And then to get those was … You know I wasn't particularly excited about getting them but actually using them then has been really good. It's been really interesting. It's been really really supportive in raising awareness around the whole thing" (IE31, ELL1)

Several participants spoke at length about how using the GroEgg influenced their perceptions of thermal comfort and also made them more aware of comfortable temperatures in their homes. Participants also reflected on these social norms about thermal comfort and hospitality, with several saying that, although they were taking part in the challenge, they would still try to keep the house warm for guests:

"I was in the hall all morning with the kids and I'm just cold, I said I don't want (the researcher) cold. And I think that's a big thing. You know my friends call and I'm thinking, oh my god they're going to freeze … You know if you have a visitor, or if you have somebody coming. Or if the kids were coming up I'd certainly change my heating habits." (IE10, ELL1)

Participants also reflected on how their energy consumption was closely linked to caring for their family and friends, with some talking about needing higher temperatures in their homes when

elderly relatives were visiting. Others spoke about having these higher temperatures when grandchildren or young relatives were visiting. Several participants also spoke about how they became more aware of how important it was to them that their children were clean, wearing clean clothes and well presented (IE09, IE33, IE20, IE26). During her deliberation interview, one participant (a school teacher) explained how memories of a neglected child wearing grubby clothes in the classroom instilled a need in her to have her children in clean clothes all of the time as she felt they were then well cared for:

"If clothes are washed well and they're nice and white. They generally smell nice and clean. And that would be a major motivation for washing clothes. To have them smelling fresh and clean and that your children would go to school with nice fresh crisp white clothes. It's evoking a memory for me because I used to work in Finglas. And I had a little girl who was very, very neglected and one Monday she came in. and she had a really crisp clean white shirt on. And she kept smelling it and she kept saying, teacher smell. And this for her was just the most luxurious thing that she ever had. She had a clean crisp white shirt on her. Because she always had a really grubby one that probably smelled as well. So it's a huge thing for you know us, as humans to have clean fresh smelling clothes. It's very important, yea." (IE09, ELL1)

This participant stated during her deliberation interview that she would be unwilling to compromise the hygiene of her children to reduce energy consumption in her home. Her statements suggest an association on her part between unclean clothes and perceived neglect of children. Interestingly, she spoke very positively about the challenge and enjoyed being given the opportunity to reflect on her laundry and heating practices. She explained that she was surprised that she was able to reduce her laundry use and that she felt quite positive about the challenge:

"But it never impacted on me negatively in that I didn't ever feel oh gosh I shouldn't have worn these for the second day." (IE09, ELL1)

All participants, bar one, were very positive about taking part in the challenge. One participant (IE33) spoke about how she felt stressed and demoralised during the ELL as she found it difficult to achieve her challenge. She explained that she found it difficult to reduce the amount of dirty clothes that her children created and that she was unhappy because she felt that her house had dirty laundry everywhere during the challenge:

"Yeah but I just… It bugged me that there was dirty clothes in their bedrooms and that they're wearing you know… Ummm… It bugged me. I don't know. It's just… You just don't want your kids going around in dirty clothes." (IE33, ELL1)

In general, the participants found the challenge kits very helpful in achieving their laundry and heating challenges. Several spoke about how the items prompted them to change their practices and served as a reminder of their target to change their practices:

"Yea some of the items were very useful. The apron idea that definitely instilled in me to, god I should be using an apron a lot more often. And the stain remover is very good. The little hanger just hanging up the towels in the bathroom, they were like they were nice little gimmicks that the added to the (hand gesture)." (IE04, ELL1)

Other participants spoke about how they enjoyed the chance to discuss their practices in the home and to reflect on the social and cultural influences on their energy use. Participants stated that they found the process of reflection fascinating and gained some insights into their behaviour. One participant reflected on how her childhood influenced practices today saying:

"I realised I am what I am. And I realised that my childhood and being frugal and that comes and stems from that and from my parents. So that hit me big time, big time." (IE10, ELL1)

Several participants spoke about the positive impact that taking part in the challenge had on their lives. Some comments were recorded outlining how spending less time doing laundry led to improvements in quality of life. One participant spoke about how his wife now had more free time to pursue activities outside of the home as a result:

"That's exactly what, she's gone off somewhere now this evening for that reason that she has no washing to do I suppose." (IE11, ELL1)

Most participants spoke about the impact of the GroEgg on their perceptions of thermal comfort. One participant also spoke about how the colour of the GroEgg routinely prompted her to wear more clothes rather than turn on the heat, saying:

"Cold, only as I say when like up to when you go in the bedroom it'd be, oh god you'd look and it's blue. And you go an either put something on you, or get a drink, or do something. Don't just stand there thinking I'm cold, never, no, no." (IE06, ELL1)

Many participants discussed, during their interviews and focus groups how much they enjoyed the opportunity to discuss their energy consuming practices. Several stated that they had never discussed their laundry routines before and enjoyed reflecting on their practices. One participant spoke about how strange she felt discussing her laundry routine because it was a private topic, but also reflected on how useful she found it:

"It's a very private thing. You don't talk about it" [so the groups were helpful and learned a lot]"
IE22 ELL2

During focus groups other participants spoke about how they developed and awareness of the social and cultural influences on their laundry and heating practices saying that it gave her:

" … more awareness of how society makes you do different things that you don't think about as you're doing it" (IE08, ELL2)

Another participant discussed how discussing social norms encouraged her to think differently about her laundry and heating practices and to reflect on how these practices emerged, while another participant explained that hearing the practices of others also impacted hers:

"When you have a house and get married, you try to fit into the norms of what people expect you to be doing, but I think doing this is a sign of going back to basics…which I think is a positive sign"
IE18 ELL2

"You change your ways when you hear what other people do" (IE27, ELL2)

There were differences in how seriously participants took the challenges, and how significant the resulting changes were. We monitored how participants felt during the challenge on a weekly basis, and the results of these questionnaires show that for the most part, participants in both ELL 1 and ELL2 reported feeling relaxed or "more or less fine" (Figure 4). Somewhat less participants in ELL2 appear to have felt excited, and somewhat more participants in ELL1 appear to have felt annoyed.

Figure 4. How participants felt during the laundry (a) and heating (b) challenge, % of participants with different feelings during weeks 1-4 of the challenge. Source: weekly surveys.

Although most participants stated that they enjoyed the challenge during closing interviews, one participant stated that she didn't enjoy the challenge at the end:

"I got fed up with it at the end to be honest. I was just… You know having dirty clothes in the house. Trying to dry wet clothes. I just had enough. And I was like I'm not even saving that much energy so… Yeah I was surprised that I would dislike the challenge so much in the end … yeah. It was a lot of work and a lot of thinking." (IE33, ELL1)

This participant also stated that she found the challenge demoralizing as she was unable to achieve her targets. Other participants who had either achieved their targets or made significant reductions (IE05, IE03, IE25, IE09, IE11 for example) stated that they really enjoyed the challenge, perhaps indicating that their level of success influences their feelings towards the challenge. During the closing survey there were large differences between the participants' feelings. These results suggest that a process of fundamental change might also require a period of feeling annoyed or anxious. These results may also suggest that initial positive feelings about the challenge may impact participants' success in achieving their targets. For example, one participant whose household successfully achieved their laundry target shared their positive emotions at the start of the challenge saying:

"Yeah. No it was fine. Ummm… Like we were eager enough and excited enough to start it you know and get things going." (IE20, ELL1)

"But it was nice to be in a challenge where you were guided by something, or the areas to look at. Or from that point of view it was nice. It just we weren't doing it on our own, we weren't kind of figuring it out on our own." (IE04, ELL1)

Another participant spoke about how talking about her laundry, taking part in the challenge and taking the time to reflect on her practices helped her to develop more positive feelings towards doing the laundry. She said she enjoyed leaving her laundry to build up for longer saying that the guilt she would have previously felt at having piles of laundry in the house was no longer there:

"That well it was either or really because you felt guilty because it was there. And you would normally do it and then you felt not guilty because yea, I've been told I can't. (All laugh)" (IE02, ELL1)

During the interviews and focus groups many participants spoke about how they enjoyed their increased awareness of their behaviour and energy practices in the home. Several stated that this increased awareness was a change in their behaviour that they intended to continue to develop after the challenge. Another participant stated that now she had more insight into her laundry practices she was keen to continue her new routine saying:

"But this whole project has made me, I can't speak for you, but for me it's definitely made me more aware of the amount of mistakes I was making. Certainly using the blooming washing, tumble dryer every day, at least once a day so ridiculous. And now I've stopped it. I'm often tempted, oh I'll just give it a quick and I think no, wait a couple of days and fill it up properly. And then it's much better." (IE06, ELL1)

One indication of sufficiency measures and a potential rupture caused by the ELLs would be if alternative, more adaptive practices of thermal comfort and keeping clean have increased. Figure 5 shows changes in the number of adaptive practices of thermal comfort used by participants before and after the heating challenge. The vertical axis shows the number of adaptive practices, whereas the horizontal axis shows the number of participants using these practices. The number of participants using 3 adaptive practices increased after the challenge. The most common adaptive practices for thermal comfort before the challenge were to use extra layers of clothing and to use blankets. After the challenge, the use of warm clothing and the use of sock and slippers increased, whereas the use of curtains decreased.

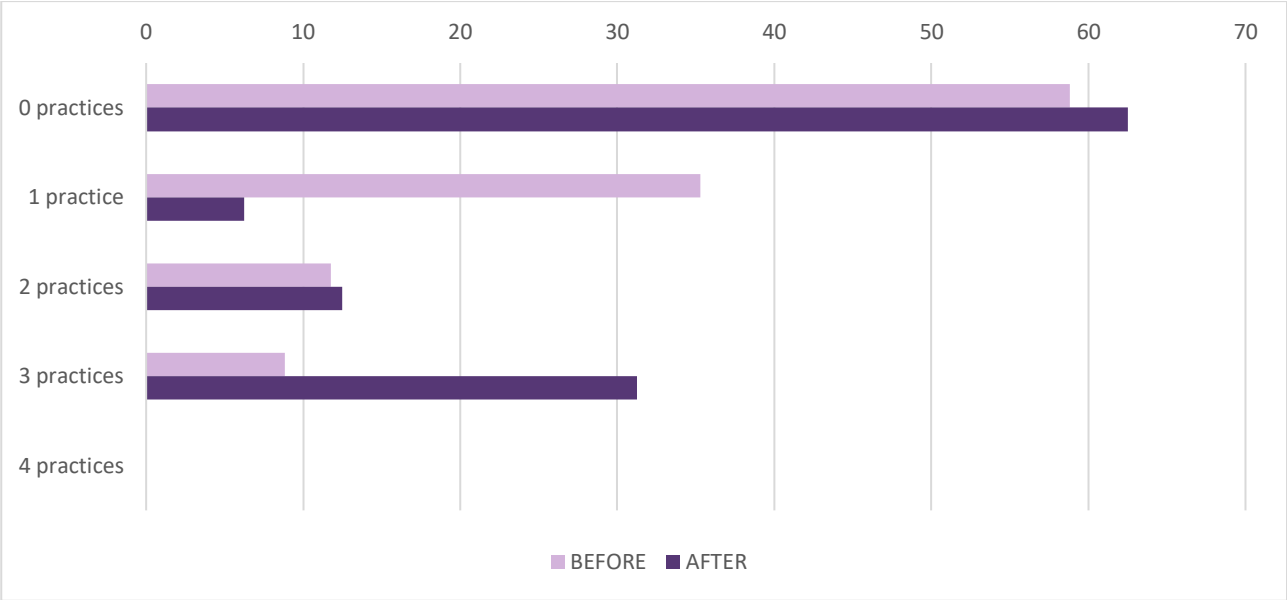


Figure 5. Changes in the number of adaptive practices of thermal comfort.
Source: baseline and closing surveys, in percentage.

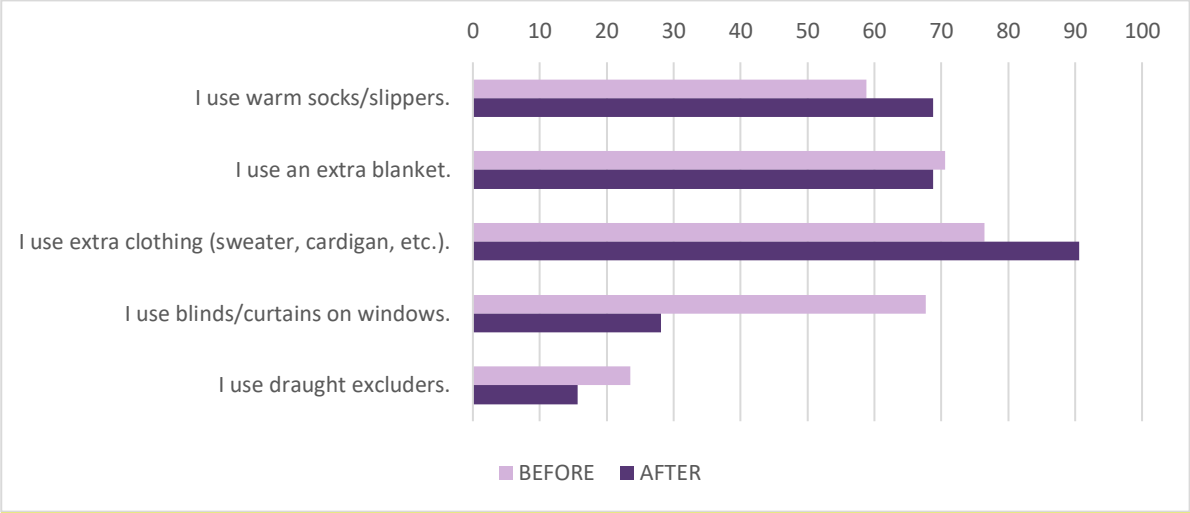


Figure 6. Changes in adaptive practices of thermal comfort.
Source: baseline and closing surveys, in percentage.

Evidence of sufficiency potential was present during the interviews and focus groups. One participant spoke about how taking part in the challenge influenced her decisions as regards the type of clothes she buys and the amount of clothes that she keeps saying:

"Again as I said it made me start to look at my whole clothes situation and I started to declutter. So I decluttered a lot of clothes that weren't necessary and kind of keeping things more tidy and hanging up clothes. You know if you have a place to hang back up the clothes that aren't necessarily dirty sometimes if you just threw things in the wash just to get them out of the way."
IE09 ELL1

Several participants discussed how useful the challenge was for engaging others in their household in reducing their energy use. One participant explained that she enjoyed taking part in the ELLs because she enjoyed taking part in the challenge as an activity with her husband:

"What I liked about it was that we were doing something together in the house. And we were both (doing it)." (IE02, ELL1)

Other participants spoke about how the challenge opened up dialogue in their household around heating that had not occurred previously. One participant spoke about how the GroEgg and its changing colour was a source of conversation about different perceptions of thermal comfort in their household:

"The boys use it (GroEgg) as like a teasing tool for me and that's par for the course here. That's absolutely fine. I suppose they used it as a weapon really because they were saying it's too hot, stop it, turn off the heating … But they would have complained anyway but they had actual evidence now. So I was (in trouble)." (IE15, ELL1)

Most participants stated that they had tried to talk to their friends and family about the challenge. Most stated those they discussed the project with were either disinterested or confused by the project or found it funny that the participants were taking part in it. One participant spoke about how her family thought it was very strange taking part in a project like the ENERGISE ELLs and concerned she might be wearing dirty clothes. But she explained that during the challenge her family never discussed or noticed that she was getting more wear out of her clothes saying:

"Yeah, I told my family, my sisters. They thought it was a bit crackers actually (laughing) they were like how are you going to reduce your laundry like. And I said well you know wear clothes more often and they were like a bit oh! Really but none of them have ever commented oh you wore that jumper yesterday." (IE09, ELL1)

"A few did. Not necessarily. A few friends of mine did. They were laughing. Yeah." (IE25, ELL1)

4. PRACTICES A FEW MONTHS AFTER THE CHALLENGE

This section explores the extent to which changes in practices arising as a result of the laundry and heating challenges persisted. These observations are based on a comparison between the baseline and closing surveys as well as a follow-up survey administered approximately three months after the end of the challenges. In the follow-up survey, we also asked households which practices the felt they had retained, and explored potential rebound effects.

In the following section, we first investigate changes, and their persistence, in observable aspects of practices, such as indoor temperatures and laundry cycles. We then investigate alternative practices of keeping warm and clean, changes in alternative practices and their persistence. Finally, we investigate changes in social norms and expectations, and the extent to which they persist over the course of the project.

4.1 PERSISTENCE OF CHANGES IN HEATING PRACTICES

Table 12 explores the persistence of indoor temperatures. For 'before' and directly 'after' the challenge, these are based on the weekly surveys, when participants checked their thermometers regularly on a particular day of the week. In the follow-up survey, we asked participants to estimate their indoor temperatures in the evening (6-8 pm). From the data, it seems that temperature

changes are relatively persistent for the three months following the challenges. Open-ended comments by some of the participants indicate that the thermometers have helped in maintaining lower temperatures even after the project. Some of the participants also indicated that they set their heating system to a lower temperature at the start of the challenge and have maintained this setting.

Table 12. Indoor temperatures before and after the challenge. Source: baseline, closing and follow-up surveys.

	Mean temperatures before and after the challenge			
	T1: Before	**T2: Directly after**	**T3: Three months after**	**Difference T3-T1**
Living area, °C	19.71	19.67	18.7	-1
Bedroom 1, °C	17.6	18.4	17	-0.6

Table 13 explores the persistence of alternative practices of keeping warm. Some practices did not increase in the course of the project (using draught excluders or using blinds or curtains). Others did increase (for example using warm socks of slippers or using extra clothing) which continued to increase after the challenge. Taking a hot bath or shower could be considered a counterproductive way of keeping warm from the perspective of energy saving, and this practice grew less common as a result of the challenge, and perhaps even after it. Overall, there is no clear decline in alternative practices of keeping warm during the follow-up period.

Table 13. Persistence of increased adoption of practices of keeping warm after the challenge Sources: Closing and follow-up surveys

	more than before, %	
	closing survey	**follow-up survey**
Turned down the heating in certain rooms	69%	59%
Turned down thermostat settings or turned off heaters/radiators when you've been away from home	13%	67%
Changed the settings on the heating timer so that the heating comes on for less time	50%	67%
Worn extra clothing to keep warm	88%	81%
Worn socks or slippers to keep warm	69%	70%
Used a blanket to keep warm when sitting on the sofa etc.	78%	81%
Used extra blankets to keep warm during the night	63%	52%
Had warm foods or drinks to keep warm	47%	44%
Moved around more in order to keep warm	38%	26%
Spent more time with family/friends in a single room	31%	22%

Table 14 highlights changes in such expectations as well as their persistence. During the challenge, people's expectations appear to have changed, with desirable temperatures in the living room and bedroom declining by one degree Celsius on average. During the three-month follow-up period, these expectations appear to have remained stable, at the reduced level observed directly after the challenge. In the interviews, several participants commented that they had got used to lower temperatures, and some also indicated that they felt physically better in cooler homes and

others in their households were happier with their thermal comfort after the challenge. Table 14 examines the persistence of potential changes in expectations toward indoor comfort.

Table 14. ELL participants' perceptions of desirable temperatures in the winter during daytime before and after the challenge. Source: baseline, closing and follow-up surveys.

	Average before	Average directly after	Average 3 months after
Living area, °C	19.7	18.7	18.7
Bedroom, °C	17.9	16.6	17.0
Child's bedroom, °C	18.6	17.7	n/a

4.2 PERSISTENCE OF CHANGES IN PRACTICES OF CLEANLINESS

Participants reduced the number of laundry cycles during the challenges by about 32 %. According to our follow-up survey, reduced laundry cycles appear to have persisted although they have risen slightly (Table 15). This is perhaps to be understood in the light of the fact that participants were mostly very satisfied with the laundry challenge, which did not entail more work but rather the adoption of a more relaxed attitude to cleanliness and more positive attitude to the activity of laundry.

Table 15. Average number of laundry cycles before and after the challenge. Source: baseline, closing and follow-up surveys.

	Average before	Average directly after	Average 3 months after[3]
Number of laundry cycles	6.7	4.6	4.7

Alternative practices of keeping clean increased as a result of the challenge by about 40% across practices (Table 16 and Figure 7). Most of these also persisted three months after the challenge, with storing slightly worn clothes for another wear and washing fuller loads slightly increasing. However, examining clothes for stains, removing stains without washing the whole item, and washing at colder temperatures seems to have declined slightly after the challenge.

Table 16. Persistence of alternative practices of keeping clean. Source: baseline, closing and follow-up surveys.

	% of participants taking these measures immediately after	% of participants taking these measures, three months after
Examined clothes carefully to see if they needed washing	97%	78%
Stored slightly used clothes in order to reuse them before washing	78%	93%
Aired clothes to postpone washing them	53%	56%
Removed stains without washing the entire item	84%	70%
Washed at colder temperatures	69%	56%

[3] This is also less reliable at T3 than when based on laundry diaries.

Washed fuller loads	59%	67%
Used the eco program on the washing machine (if there is one)	38%	41%

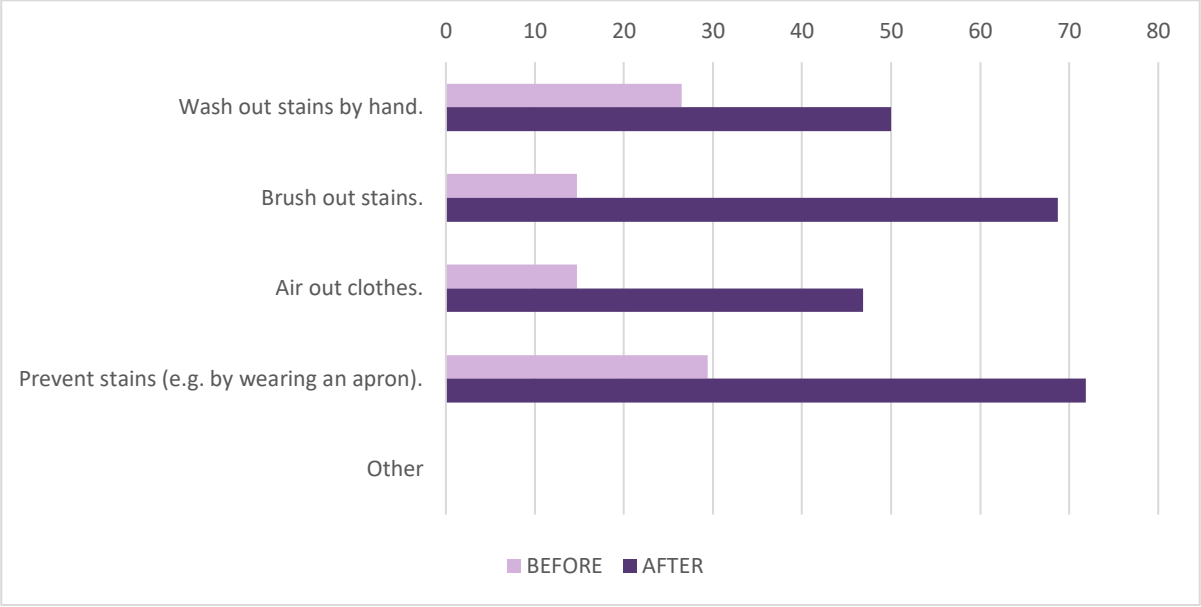


Figure 7. Changes in adaptive practices of laundry. Source: baseline and closing surveys, in percentage.

The most common adaptive practices before the challenge for laundry were to wash stains out by hand or to wear an apron to protect clothing. After the challenge, all adaptive practices increased i.e. washing clothes by hand, brushing out stains, airing out clothes and preventing stains. The two practices with the greatest increase were brushing out stains and preventing stains by using an apron, perhaps as a result of their inclusion in the kit.

The challenges appear to have prompted changes in norms relating to laundering, since criteria for determining whether an item needs washing changed among several participants from length of wear to smell (Table 17). Three months after the challenge, length of wear seems to have declined even further as the main criterion, whereas the role of "smell" appears to have increased and remained stable three months after.

Table 17. Persistence of changes in criteria for deciding when items require washing

	Share of households using this criterion, %		
	Before	**Directly after**	**3 months after**
I don't know	0%	3%	0%
Stains	12%	44%	26%
Smell	18%	38%	41%
Length of wear	*71%*	50%	33%
Other	0%	0%	0%

4.3 POTENTIAL EFFECTS: CALCULATED CO2 SAVINGS, SPILLOVER EFFECTS, REBOUND EFFECTS AND POTENTIAL FOR SCALING UP

This section explores the potential effects of the ELL challenges, based on data collected in the follow-up survey sent out three months after the end of the challenge. We consider the achievable CO2 savings from the ELL challenges, as well as potential spillover effects, which can magnify the effectiveness of the ELLs. We also explore the potential for scaling up on the basis of how participating households have communicated and are willing to communicate on the ELLs.

Rebound effects were varied in both ELLs and ranged from changes in other activities in the home to possible health impacts from increased consumption of hot whiskeys. Several participants stated that during the challenge their consumption of hot whiskeys increased in an attempt to keep warm. This increased consumption of hot whiskeys may have negative health implications for those participants. Participants also spoke at length about how taking part in the challenge impacted their energy consuming practices in other areas of their lives, particularly their homes. One participant spoke about how she began to think more about her other household routines and, as a result of the project, changed her routine around using the dishwasher saying:

"Yes the dishwasher definitely. I now put it on a three and a half hour eco wash that goes through the night. I never put it on when we're not here. But I will load the dishwasher up through the day. And the last thing I do after I've got out food for the morning ready, I will put the dishwasher on three and a half hours on an eco-wash. And in the morning it's all done." (IE06, ELL1)

Other participants spoke about how taking part in the challenge encouraged them to change their energy practices in work and make changes to reduce their consumption. One participant spoke about how he had changed his practices in the work place as a result of taking part in the study saying:

"You know even at work and that you'd be thinking, look at all the waste here; I'll turn off my computer at work now. And you know you'd be trying to plug out stuff at work and that. Whereas before you wouldn't bother like you know. Yea it does make you think a bit more… All the waste and electricity and I never even thought of electricity as waste you know that way before. Or energy even as waste. You know you'd think rubbish, you wouldn't think of." (IE11, ELL1)

When asked how taking part in the project changed their routine, most participants stated that they felt it didn't change their routine much, but that they had more time to relax. However, others explained that they changed the time of day they went for their run or when they did other activities around the home. One participant, a part-time farmer, explained that because he was taking part in the challenge his pig and hens had to go hungry for a little while in the morning because of the change in routine saying:

"Yeah I just laughed there. It's completely bizarre and seemingly unrelated to routine change but umm, it meant the pig got fed later… Instead of taking the clothes out of the thing and putting them in the tumble drier which would be then the same time then when I'd go and feed the pig and the hens and the geese and that, then I was hanging them on the radiator instead. So it meant then I think I wasn't actually going outside." (IE16, ELL1)

In addition to savings achieved in laundry and heating, it was expected that experimentation with new practices in the ELLs might also encourage households to experiment with new energy saving practices in other areas. Table 18 explores spillover effects from the ELLs into broader

engagement with energy, as well as the persistence of these changes three months after the end of the challenge. From the questionnaire data, spillovers into other domains only occurred when participants were considering energy efficiency when buying electrical appliances. As regards the persistence of practices there is no clear decline in most from the post-challenge situation to the follow-up questionnaire three months later, however the impact on purchasing energy efficient appliances considerable increased post-challenge.

Table 18. Spillover effects from the ELLs: changes in general engagement with energy and climate issues. Source: baseline, closing and follow-up surveys.

	Before %	**Directly after %**	**3 months after %**
Not specifically.	18%	6%	7%
Raise energy and climate issues at home or with friends.	59%	69%	59%
Raise energy and climate issues at work.	32%	28%	26%
Raise energy and climate issues in NGOs or other groups of which I am a member.	9%	9%	11%
Actively search for news or information on energy and climate issues.	32%	38%	41%
Consider energy and climate issues when voting.	38%	22%	48%
Consider energy efficiency when buying electrical appliances/devices.	68%	66%	89%
Other	0%	6%	0%

The potential socioeconomic impacts of the ELLs were evaluated on the basis of money and time saved. Most commonly participants did not feel able to estimate the amount of money saved. One participant estimated a saving of €2,000 per year in oil. Participants were unable to determine how much they would save as they will only be able to determine how much is saved by assessing how many times they fill their oil tank in the year.

Table 24 explores the participants' most common expectations concerning activities for which they would use any money or time saved, if any. Mostly the participants expected they would use the money saved for everyday running costs. Time saved due to less laundering was most commonly expected to be used for other housework, reading or sports or outdoor activities.

Table 19 What would savings be used for: most common responses (n=26). Source: follow-up survey.

Money saved would be used for		**Time saved would be used for**	
Not applicable, no money saved	0%	Not applicable, no time saved	0%
Everyday running costs	54%	Sleeping	4%
Savings	11%	Reading	29%
Eating out	7%	TV / computer	13%
Purchase of new equipment (please specify),	0%	Cooking	8%
Entertainment	11%	Other housework	38%
Travel	11%	Home maintenance	13%
Don't know	7%	Sports or outdoors	25%
Other	0%	Cultural activities	0%
		Social activities	13%
		Working	0%
		Travel	8%

		Don't know	21%
		Other	0%

The broader impacts of the ELLs on everyday practices depend on the dissemination of the new norms beyond the participating households. Table 20 presents the extent to which participants have shared, or would consider sharing, their experiences from the challenge. Only 15% of the participants reported not having shared their experiences with anyone in person. All participants shared their experiences by discussing them with friends and via Facebook, or by discussing them with relatives, co-workers and neighbours. Some people shared their experiences to a wider circle by speaking about the challenges at work, at associations.

Table 20. Share of households having shared or willing to share experiences (n= 27). Source: follow-up survey.

	Has shared, %
Not particularly	15%
Other members of my household	48%
Relatives	56%
Friends	67%
Neighbours	19%
Co-workers	33%
Groups/associations	22%
Children's school or e.g. sports club	4%
Others	4%
Facebook, Twitter or Instagram	100%
Blog post	0%
Newspaper article	0%
Other	0%
total respondents	

When asked about whether they would take part in other initiatives similar to the ELLs most participant stated that they enjoyed the ELLs and they would be happy to engage in something similar again. One participant thanked the researcher for the opportunity to take part saying:

"Thank you and it's been very beneficial and very rewarding and very good to meet you. (Laughs)." IE06 ELL1

5. FEEDBACK FROM PARTICIPANTS AND IMPLEMENTATION TEAM ON ELL IMPLEMENTATION

Open-ended comments at the end of the follow-up questionnaire indicate a general appreciation of the challenges, willingness to participate in other such initiatives, and to engage others in doing so, at least among a share of the participants. Thirteen respondents offered open-ended comments, most of them stating that it was fun to participate or that the project was a useful experience that made them think about and question their routines. One participant, a young mother of two young children wrote:

"I found it a really rewarding and fascinating experience to alter my views on what is normal or perceived as normal in our society. I learned a lot" (IE08, ELL1)

Some participant stated that they found the challenge difficult at first, but after a little they got used to recording their day with one participant saying:

"I got used to it after a while, at first I thought, oh I must write it. And then eventually I left all the paper work out there and just wrote it down. And it does give you an awareness. It definitely makes you aware." (IE06, ELL1)

Participants in general said that they found the implementation of the ELLs quite relaxing with many saying they did not feel under pressure. One participant stated:

"I didn't feel when you say challenge it got me thinking. But I did feel if I didn't manage this, or whatever it was fine too. I didn't feel under pressure with it." (IE10, ELL1)

Another participant explained that she enjoyed taking part in the challenge because she felt she was contributing to research for the betterment of society. She explained that this was an incentive for her to continue to engage with the challenge and that feeling comfortable with the researcher was also an important influence on her continued engagement saying:

"I felt I was participating in something. It didn't take too much of my time and if it can make a difference to any one thing ... And always answered our questions and a total pleasure just to sit and have a chat. That's what it feels like rather than an interview." (IE15, ELL1)

Unlike other ENERGISE implementation teams, the Irish ELLs were implemented by a single researcher. Several participants spoke about how important the continuity of contact and development of a research relationship with the researcher with one participant saying:

"No it was. I mean you know if you had come and I had said to myself oh no I don't know whether I've taken on to her. But I mean you know not that you sold it but I just felt you were very genuine about it. And I felt when I made the commitment and you did. As you say you made the effort to know people and you tuned in and you didn't… You weren't rushed when you came and you came at the appointed time which is a big thing…I mean if that had come in the post I think after three weeks I'd say what am I doing this for. There isn't… There's not the same contact with it. (IE25, ELL1)

6. CONCLUSIONS/REFLECTION

The findings from the Irish ELLs suggest that as a result of the challenge most participants reduced their laundry cycles by 31% during the challenge period. Prior to the challenge, many participants were undertaking 4 or less cycles of laundry in their homes per week. 75% of participants in ELL1 and 83% of participants in ELL2 selected the common challenge. Those that did not choose the common challenge selected their own targets which included changing a range of practices related to laundry (e.g. using the eco-button, using less detergent or doing fuller loads of washing). Those that took part in the group challenge and discussion had a greater reduction in their laundry than those that took part in the individual challenges. The reduction in the number of laundry cycles was

greater in ELL2 than ELL1. There was a 27% reduction in the amount of laundry cycles per week for ELL 2 and only by approx. 1% in ELL1. An increase in the number of alternative practices of keeping clean (removing stains, protecting clothing) was observed. Perceptions of social norms around cleanliness also changed (particularly related to children's clothes) with clothes being worn for longer.

Baseline data for temperature in the Irish ELLs was relatively low in living areas at 19.7$_{o}$C on average. There were slightly lowered temperatures in the living room in ELL1 and ELL2 of -0.04$_{o}$C. Several participants spoke about the difficulties involved in regulating the temperatures in their living spaces due to the use of stoves and fireplaces to supplement their central heating. Although all households in the study were single family households, participants reported that the use of stoves and fireplaces created fluctuations in temperatures.

The Irish ELL results suggest that laundry practices and social norms around cleanliness are easier to change than heating practices and perceptions of thermal comfort. Many participants started several new practices reduce their laundry that persisted after the end of the challenge. The most popular practices to persist after the challenge were preventing stains with protective clothing, airing out clothes, smelling clothes to determine if they need washing and washing clothes less often. Several participants spoke about the laundry challenge as a communal activity in the household and that part of their strategy for reducing laundry was to engage children in the activity of assessing whether clothes are clean, protecting their clothing or helping to sort clothes into laundry baskets so that larger washes could be done.

Participants entered into the challenge with a wide range of expectations of the challenge. Perceptions of thermal comfort were relatively similar across ELL1 and ELL2, perhaps because most participants had similar heating systems and housing types. However, laundry practices were more varied, perhaps due to the wide range of household types involved in the study. Most participants perceived 20 or 21$_{o}$C to be a comfortable temperature with some saying they were comfortable at 24$_{o}$C. Practices of laundry were varied with the number of washes per household ranging from 3 per week to 17 per week for some. These different practices prior to the challenge impacted on the participants' ability to meet their targets, with households on average in ELL2 doing more washes per week than those in ELL1.

The differences in outcomes between ELL1 and ELL2 were not significant for temperature reductions (slight reduction in temperature in ELL1 and slight increase in ELL2) but were significant in terms of laundry cycles (a 1% reduction in ELL1 and 27% in ELL2). ELL2 participants reported that meeting others in the group challenge and discussing their practices and routines around laundry was very helpful in reducing their laundry cycles. Several also stated that discussing their practices with others in a group conversation helped them reflect on their own laundry and heating related practices.

When asked, participants stated that they shared their experiences of the challenges with family and friends and all of them shared it on social media. The ELL2 case site suggests that school communities offer opportunities for scaling up as participants were relatively comfortable talking about laundry with other parents and participants in the school community. Participants' narratives also suggest that the workplace is not necessarily useful for diffusion as, although most participants said that their practices were influenced by social norms in work, they were not keen to engage in conversations about thermal comfort, laundry or cleanliness with work colleagues.

When reflecting on the implementation of the Irish ELLs, participants suggested that future projects should expand beyond the practices of laundry and heating into other energy intensive practices in the home (washing dishes, appliances, hot water). Participants also suggested that a challenge similar to the ELLs may be easier to scale up if technology and smart phones could be used to enter the data on their practices. Although many participants stated that more use of technology would be useful, most participants stated that it was important that an approachable researcher was available to visit their homes and help them through the ELL challenge and guide them in achieving their targets.

The Irish ELLs indicate that with today's changing perceptions of behaviour change initiatives and a greater awareness of climate change, it is an appropriate time to encourage changes in practices, material conditions and technology related to laundry and heating in Irish households. The Irish ELLs suggest that there is an increased opportunity for sufficiency measures moving forward and positive the impact of the ELLs on purchasing of energy efficient items was evident in the follow-up surveys. Participants that had a dedicated space for doing laundry fared better at achieving their laundry targets than those that didn't. This potentially offers an opportunity to scale up this project through a cultural shift in material arrangements related to laundry in Irish households. The evidence suggests that, although 18$_o$C was deemed too cold by many, a temperature of between 18.5 and 19$_o$C was acceptable for many. Thermometers and more visual thermostats also offer opportunity to scale up as all participants stated that the visual aspect of the thermometers coupled with the interviews and focus groups challenging perceptions of thermal comfort prompted them to change their temperature. Participants, in their feedback, suggested that this type of project was beneficial and they felt that it could be developed at a larger scale to engage with other practices in the home.

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Annex: Outdoor temperatures during the ELL and relationships between indoor and outdoor temperatures, MET (2019).

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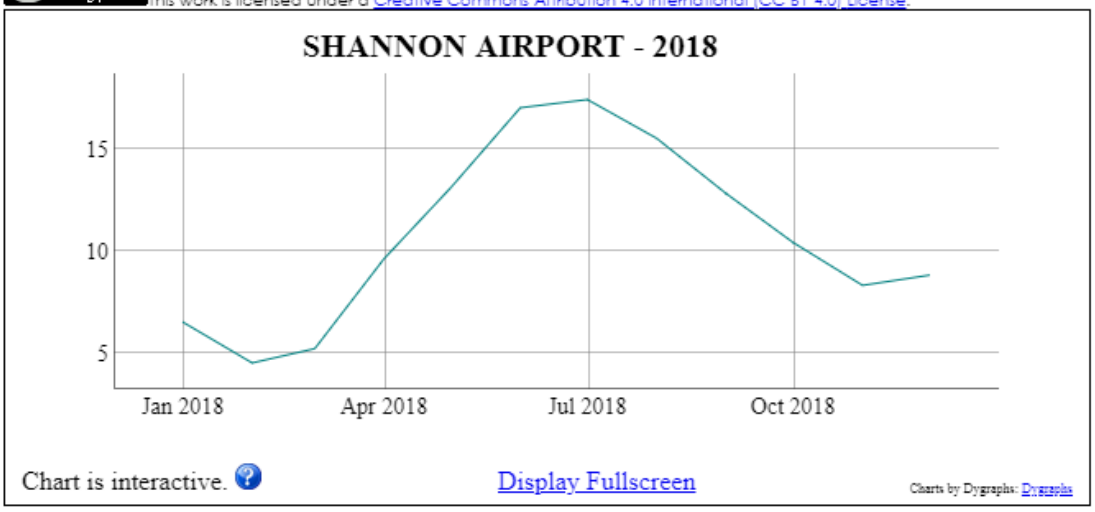

SHANNON AIRPORT
meant: Mean Air Temperature (C)

Date	meant
jan-2018	6.5
feb-2018	4.5
mar-2018	5.2
apr-2018	9.6
may-2018	13.1
jun-2018	17.0
jul-2018	17.4
aug-2018	15.5
sep-2018	12.8
oct-2018	10.4
nov-2018	8.3
dec-2018	8.8

Print data table

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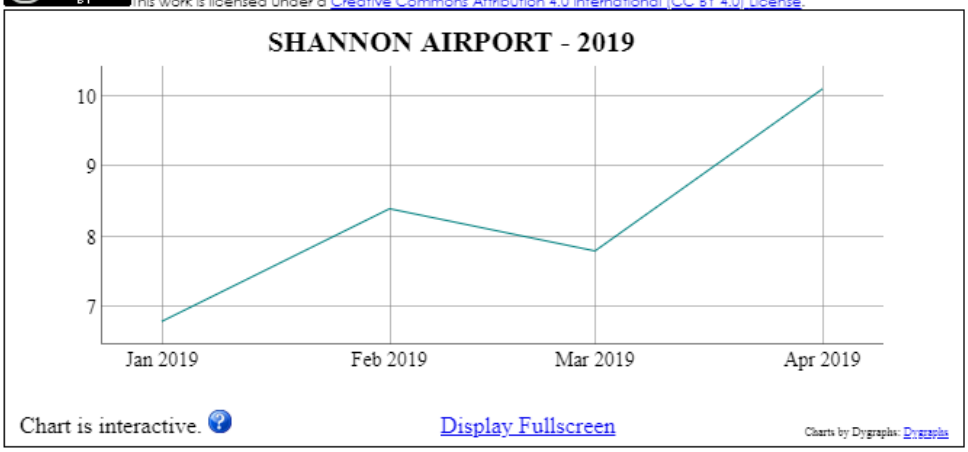

SHANNON AIRPORT
meant: Mean Air Temperature (C)

Date	meant
jan-2019	6.8
feb-2019	8.4
mar-2019	7.8
apr-2019	10.1

Print data table