ENERGISE

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

LIVING LAB COUNTRY REPORT – SWITZERLAND

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SUMMARY

In Switzerland, the two ENERGISE Living Labs (ELLs) took place in the City and Canton of Geneva, in the French-speaking region of the country. The first Living Lab (ELL1) included 20 households with diverse profiles, from one- and two-person households to families with two or three children, and with participants of all age groups. A large majority of them lived in multi-family houses or larger apartment buildings, reflecting the housing situation in Switzerland. The second Living Lab (ELL2) was organised in a community of place, a housing cooperative located in the Geneva city center. The participants' profile was also varied in terms of age group and type of households.

Most households opted for the challenges suggested by the ELL research team: halving their number of laundry cycles, and lowering indoor temperature to 18°C. Although participants generally didn't manage to decrease the number of laundry cycles by half, most managed a significant reduction in laundering and considered the challenge to have been a success. Because of an exceptionally warm autumn in Geneva, only a few households managed to reach a temperature of 18°C, even with their heating systems completely turned off. This caused frustration for many participants, who felt they didn't "really" participate in the challenge.

The heating challenge allowed participants to reflect on their sense of comfort, and the related social norms. While many had difficulty being comfortable at significantly lower temperatures than they had been used to, they were still able to reduce by a few degrees by adjusting some already existing practices, such as putting on more layers of clothing (which was the most common strategy for keeping the body warm) or using a blanket when sitting on the sofa. In some cases, the challenge inspired participant's friends or neighbours to try and reduce their indoor temperature (or their laundry cycles) as well, which was a positive spillover effect. As for the laundry challenge, it led to a transformation of the criteria for cleanliness among participants, who could experience how wearing the same clothes longer or washing fuller loads doesn't have any negative consequence, while doing less laundry is a relief in terms of stress and the pressure to always have to deal with dirty clothes immediately. Material arrangements were a central element for the organisation of practices in both challenges. Participants had to get more familiar with their washing machine and their heating system in order to complete the challenges. For the washing machine, it meant studying the different programmes, especially the eco-programme, and identifying what uses the most energy in a laundry cycle. For the heating challenge, ELL2 participants and a few ELL1 participants had to understand the functioning of their floor heating systems and the appropriate way to live in their buildings, which were in most cases energy-efficient and self-ventilating, meaning that windows should not be opened when the heating system is on, for example. All households but three live in apartment buildings and only six are owners, all others being either tenants or living in a housing cooperative. As a consequence, participants often had only partial control or access to their heating system, and sometimes no access at all.

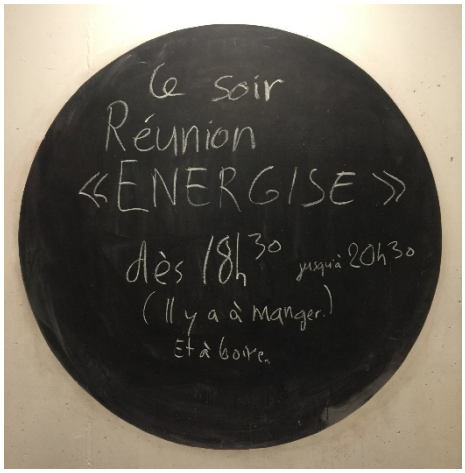
Tools that help make energy visible, such as thermometers or watt-meters, along with diaries, created a reflexive stance among participants and motivated them to change their practices. Having the opportunity to try new ways of living and becoming aware of social norms behind everyday practices are two effects of the ELLs that seem to have long-standing implications towards sustaining social change. Results from a survey conducted three months after the end of the ELL show that the number of weekly laundry cycles and declared indoor temperatures were lower after the challenge than before the challenge, and participants' feedback on their experience was overly positive.

1. ELL DESCRIPTION

Both of the Swiss ELLs took place in the City and Canton of Geneva (population of 200,000 and 500,000 respectively), where the research teams and implementation partners have experience and contacts. Two implementation partners were recruited: the Terragir association is based near the Les Vergers eco-neighbourhood which is under development in the Meyrin area (within Geneva state), with experience working specifically on energy-related issues. Terragir and the University of Geneva team had collaborated in the past on the Jean Challenge[1]. The Urbamonde association was also invited as a second partner, with expertise working on participative methods for urban planning at the community level. Both Terragir and Urbamonde assisted with recruiting households for ELL1 and ELL2, through their networks. The University of Geneva's team also used social media and emails for recruitment purposes, and benefited from some press visibility in autumn 2018 around the Jean Challenge, with a call for participation in the ENERGISE challenges[2]. It was more challenging to recruit ELL2 participants, as we were keen on recruiting a "community of place". We were introduced to members of a new housing cooperative, between the Geneva train station and United Nations areas. In visiting the members during a general assembly on June 18, an initial 15 households signed on to the challenge and we were then able to recruit 17 in total; ultimately, 16 participated in the ELL2 challenge. The recruitment started in June and was completed in September 2018. 35 households completed the ELL challenges in Switzerland, amounting to 112 household members, although not all of them actively took part in the challenges.

Picture 1. ELL2 participants at work during the deliberation focus group

"Tonight, ENERGISE meeting, from 18:30 to 20:30 (there is food and drinks)"



[1] See Sahakian, M. and L. Dobigny (2019). From governing behaviour to transformative change: A typology of household energy initiatives in Switzerland. *Energy Policy*, *129*: 1261-1270. For an introduction to the Jean Challenge, which was modeled after: Jack, T. (2013). Nobody was dirty: Intervening in inconspicuous consumption of laundry routines. *Journal of Consumer Culture*, *13*(3): 406-421.

[2] Changer les normes pour moins consommer (Changing norms towards reducing consumption), La Revue Durable, N°61, été-automne 2018. https://www.larevuedurable.com/fr/consommation-et-dechets/1223-changer-les-normes-pour-moins-consommer.html

1.1 SOCIODEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS OF THE ELL PARTICIPANTS

The main sociodemographic and socioeconomic characteristics of ELL participants are shown in Table 1. We aimed at building a sample as representative of the population of the City and Canton of Geneva as possible. However, working with a community of place (the inhabitants of a cooperative building), and recruiting within the existing networks of the implementation team, led to an over-representation of respondents with a higher education degree (31 participants out of 37, or 84%). As a comparison, the Human Development Reports from the United Nations development programme shows a gross enrolment ratio in tertiary school of 58% for Switzerland in 2017 (UNDP 2018).

Otherwise, our sample is mostly diverse in terms of household, buildings, and respondent characteristics. In total, 41% of the respondents live in a four-person household, mostly families. Having many families in our sample meant that we could also gather information on the practices and representations of children and teenagers, mostly via the words of their parents. Slightly more women (20) than men (17) subscribed to the challenge. Half of the contact persons were aged between 41 and 50 years old, 19% were between 31 and 40 years old, and 16% were between 51 and 60 years old. As such, most of them were adults active in the labour market: 27% of the participants worked full-time, 46% part-time, and three participants (8%) were entrepreneurs or self-employed. This is close to the situation in Switzerland, where 37% of the active population was working part-time in 2018 (Swiss Federal Statistical Office 2019a). 54% women in households where both gender were represented worked part time, whereas 50% of men worked full time.

Table 1. Sociodemographic and socioeconomic characteristics of participating households
Source: recruitment survey; n=37

	Total (n=37)		**ELL1** (n=20)		**ELL2** (n=17)	
Household size	**n**	**%**	**n**	**%**	**n**	**%**
1	5	14%	3	15%	2	12%
2	6	16%	5	25%	1	6%
3	8	22%	3	15%	5	29%
4	15	41%	8	40%	7	41%
≥5	3	8%	1	5%	2	12%

Age group of the contact person	**n**	**%**
≤30	2	5%
31-40	7	19%
41-50	18	49%
51-60	6	16%
61-70	3	8%
>70	1	3%
Average: 47 years old		

Gender of the contact person	**n**	**%**
Woman	20	54%
Man	17	46%

Employement status of the contact person	**n**	**%**
Full-time	10	27%
Part-time	17	46%
Entrepreneur	3	8%
Unemployed	0	0%
Student	1	3%
Retired	**3**	8%
Other	3	8%

Educational level of the contact person	n	%
Higher education	31	84%
Secondary education	1	3%
Vocational training	3	8%
Basic education	0	0%
Other	2	5%

1.2 REASONS FOR PARTICIPATING AND PRIOR EXPERIENCE OF ENERGY INITIATIVES

Most ELL participants say they are already aware of ecological issues and try to reduce their environmental impact, and the challenges are part of that effort. Many enjoy challenges in general and learning through them, trying new ways of doing things, and discovering new possibilities. For example, while enrolling for the challenge, a 51-year-old woman said she does it mostly for fun. In the deliberation interview, she says: "Personally, I love doing this kind of thing! I really enjoyed it. It's something I'm interested in. Otherwise I wouldn't have done it." For one other participant (male, 47 years old), the main motivation was to help in the creation of new ways of life, and having a transformative effect on routinized everyday life:

> It's like the challenge is really this idea of, if my own experience, what's happened to me… if that can be useful for gathering info and preparing other ways of doing things in the future, and changing the model that we have from before them, I'm happy to give my time, to the extent that I feel like there's a solid basis behind it all (…) and that there will be an impact afterwards.

For ELL2 participants, who all live in a same building, peer pressure played a role in enrolling, as many didn't want to be seen poorly by their neighbours. One woman didn't understand that taking part in the challenge was optional and subscribed at first, but pulled out her participation before filling the baseline survey. For the vast majority of households, this was their first participation in an energy initiative. Only a minority has previous experience of energy initiatives, such as incentives to buy efficient appliances or measures to support building energy efficiency, as shown in Table 2.

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

	All (n=37)						**ELL1** (n=20)		**ELL2** (n=17)	
	At home		**At work**		**At school**		**At home**		**At home**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Information campaign, tips for saving energy	4	11%	2	5%	3	8%	4	20%	0	0%
Incentive to buy efficient appliances (including light bulbs)	6	16%	1	3%	0	0%	6	30%	0	0%
Incentives to invest in renewable energy (e.g. PV)	2	5%	0	0%	0	0%	2	10%	0	0%
Incentives or support for energy efficiency measures (e.g. wall/roof insulation)	3	8%	0	0%	0	0%	3	15%	0	0%
Challenge/discussion to change habits and everyday routines	1	3%	0	0%	3	8%	1	5%	0	0%
Other	5	14%	7	19%	5	14%	3	15%	2	12%

1.3 BUILDING CHARACTERISTICS OF ELL PARTICIPANTS

Table 3 shows only six homeowners among ELL1 participants, and all ELL2 participants live in the same cooperative building. The particular status of cooperative buildings seems to have caused confusion among ELL2 participants in filling the recruitment survey: roughly one half indicated they are tenants, the other half-checking "other". Similarly, a few ELL1 participants also live in a cooperative but this information that was not captured by the recruitment survey. 15% of ELL1 participants live in a single-family house, with every other household living in apartment buildings. The characteristics of the participants' dwellings are representative of the situation in the Canton of Geneva, where a vast majority of people are tenants in multi-family houses (Swiss Federal Statistical Office 2019b). For this reason, many participants had little influence and often limited understanding of their building's energy supply and heating system. Most households lived in buildings built after 1970. The cooperative in which ELL2 took place was built after 2010 following the building guidelines of a Swiss energy efficiency label, Minergie[3]. Half of ELL1 participants live in buildings built between 1970 and 2010, with variable quality in terms of insulation, types of appliances offered, and energy efficiency in general.

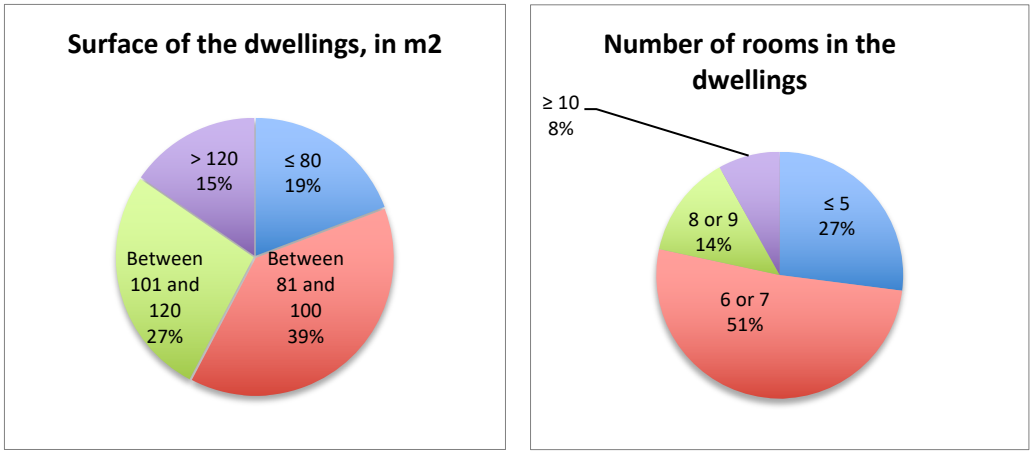
Table 3. Characteristics of the participants' dwellings
Source: recruitment survey; n=37

	Total (n=37)		**ELL1** (n=20)		**ELL2** (n=17)	
	n	**%**	**n**	**%**	**n**	**%**
Dwelling tenure						
Tenant	21	57%	6	30%	8	47%
Owner	6	16%	6	30%	0	0%
Other	10	27%	1	5%	9	53%
Type of dwelling						
Detached house	2	5%	2	10%	0	0%
Semi-detached house	0	0%	0	0%	0	0%
Terraced house	1	3%	1	5%	0	0%
Apartment building	33	89%	17	85%	16	94%
Student housing	0	0%	0	0%	0	0%
Senior housing	0	0%	0	0%	0	0%
Other	1	3%	0	0%	1	6%

[3] See the Minergie Web page, which explains the Minergie-P label (only available in French, German, and Italian): https://www.minergie.ch/fr/comprendre/labels-de-construction/minergie/

For the biggest part, most households lived in apartments or houses with a living surface between 81 and 100 square meters (39%), and a little bit over half of them had 6 or 7 rooms (Figure 1). For comparison, in Switzerland in 2017, dwellings had an average of 0,60 occupants per room, and 2,2 occupants per dwelling. In the Canton of Geneva between 2011 and 2017, the average floor space was of 86 square meter (Swiss Federal Statistical Office 2019b). Most households lived in bigger dwellings than the cantonal average. As cooperatives traditionally offer lower rent than rentals owned by private individuals or companies, the choice of location for ELL2 can explain part of this difference, along with the higher level education in our sample in comparison to the national average, which can hint at higher income.

Figure 1. Surface and number of rooms of the participants' dwellings
Source: recruitment survey, n=37



The heating for ELL2 building is provided by a heat pump, as it is the case for 38% of ELL1 households. For ELL1, oil and gas were the second and third most frequent heating sources (Table 4). All families have individual control on the temperature in each room of their home or their apartment although in apartment buildings, the system might be set not to go below a certain temperature, a setting on which participants have little control.

Table 4. Primary and secondary heating sources of ELL participants
Source: recruitment survey; n=37

	All (n=37)				**ELL1** (n=20)		**ELL2** (n=17)	
	Primary		**Secondary**		**Primary**		**Primary**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Gas	6	16%	1	3%	5	25%	1	6%
Oil	7	19%	1	3%	7	35%	0	0%
Coal	0	0%	0	0%	0	0%	0	0%
Electricity	1	3%	4	11%	1	5%	0	0%
Biomass (wood)	0	0%	2	5%	0	0%	0	0%
Solar energy	1	3%	4	11%	0	0%	1	6%
Heat pump	14	38%	5	14%	1	5%	13	76%
District heating	3	8%	2	5%	2	10%	1	6%
Other / Don't know	5	14%	4	11%	4	20%	1	6%

Shared laundry rooms are very common in Switzerland, as seen in Picture 2. All of ELL2 participants and one third of ELL1 households have access to such a facility, as shown in Table 5. More than half of ELL2 participants nonetheless owned a private tumble dryer, which is the case for only 30% of ELL1 participants. All participants owning a tumble dryer had a private washing machine in their home, and some had washer-dryers.

Accordingly, exit interviews showed that hanging laundry in the apartment is a very common practice among ELL1 families, not so much in ELL2 households. The washing machines from the ELL2 shared laundry rooms offer an eco-programme, along with the machines of 58% of ELL1 households, but A++ washing machines were the exception more than the norm, with only one third of households owning one. It is possible that some respondents didn't know the energy efficiency label of their machine.

Table 5. Laundry equipment owned or used by the households
Source: recruitment and baseline surveys; n=37, 35[4]

	Total (n=35;37)		**ELL1** (n=19;20)		**ELL2** (n=16;17)	
	n	**%**	**n**	**%**	**n**	**%**
Use of a shared laundry room	23	62%	6	30%	17	100%
Private tumble-dryer or drying cabinet	15	41%	6	30%	9	53%
A++ machine	11	31%	6	32%	5	31%
Eco-programme	25	71%	11	58%	14	88%

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

Before starting recruitment, in addition to the ideation session which took place with all consortium members around ELL design, the Swiss team organised a brainstorm with implementation partners to discuss how the challenges could be introduced, and what to include in the challenge kits. This co-design session took place at the University of Geneva on June 11, and involved the research team along with: Terragir and Urbamonde, with expertise in energy initiatives and participatory methods respectively; Happy City Lab, represented by Dan Acher and with expertise in cultural

Picture 2. Shared laundry rooms are very common in Switzerland

[4] The data for the use of a shared laundry room and private tumble-dryer of drying cabinet are from the recruitment survey (n=37). A++ rated washing machine and washing machine and eco-programme are from the baseline survey (n=35).

activism; and Ab-eco, represented by Anahide Bondolfi and with expertise in energy issues and life cycle assessments. As a result of this session, we shared ideas on what to include in challenge kits, what key messages we wanted to put forward with households, and how to engage households in different forms of reflection and deliberation.

The challenge kits used in Switzerland followed what was suggested for the consortium overall, with some nuances: for the laundry kit, we include “Terre de Sommières” which is a clay powder used for detaching stains. An apron was also provided, along with a rack for hanging clothes. We sourced as many local products as possible, including a wooden brush for removing stains. For the heating kit, we chose another family game – 6 qui prend! - and provided high-quality socks, fair-trade teas and cocoa, and locally sourced mugs, which were generally appreciated. Each of the kits was labelled with ENERGISE stickers and a “open on date” sign, which indicated the start of the challenges. For the laundry challenge, the start date was October 15, 2018 (through November 11); and for the heating challenge, the start date was November 5, 2018 (through December 3).

Picture 3. Content of the heating and laundry challenge kits

Each of the ELL1 and ELL2 households were visited by Terragir for the baseline phase and installation of wattmeters, thermologgers and thermometers. As a Swiss particularity, some households had shared laundry facilities in buildings, where installing meters was not practical. All ELL1 households were then visited twice by the research team, for the deliberation and exit interviews. Focus groups were hosted in the shared building space of ELL2, which meant that families came together for the discussions – with children of all ages joining in and out of focus groups. For ELL2, we hosted dinners after our discussions, catered by a solidarity-based migrant woman’s group in Geneva (Iranian then Peruvian meals were served).

Thanks to a press release that was issued prior to the launch of the ELLs, we gained press interest from the regional news programme. A television crew therefore visited one of our ELL1 households prior to and directly after the challenges. This piece was aired on the evening news, December 12, 2018, giving regional visibility to the ENERGISE project[5].

2. PRACTICES BEFORE THE CHALLENGE

In this section, we explore the practices in place before the challenges with data collected during the deliberation phase. More specifically, we will be looking at habits and routines around heating and

[5] « Mettre au défi les familles par ENERGISE » ; RTS Info, 19:30. https://www.rts.ch/play/tv/19h30/video/consommation-energetique-des-menages-mis-au-defi-de-diminuer-leur-consommation-electrique-de-chauffage-ou-de-lessive-?id=10064953

laundry, at competencies and skills that support the practices in place, and at social norms and representations of thermal comfort and cleanliness. The analysis stems from the qualitative interviews with ELL1 participants and the focus group discussions with ELL2 household members that took place before the beginning of the challenge, and on the baseline survey.

2.1 PRACTICES RELATED TO THERMAL COMFORT

Feelings of thermal comfort are per definition subjective and depend on habits formed over time, on social norms and representations of how comfort should be achieved, on the material context including the heating system and how a house or an apartment is built, while also being influenced by individual, physiological factors. All these factors combined are at play to influence how some people can experience a room or a bodily feeling as comfortable, and others as too cold or too warm, for example. In the following pages, we will look at representations of thermal comfort, habits and routines, but also strategies for keeping warm, the impact of heating systems and the ability to control the indoor climate, and how this relates to social norms linking practices of thermal comfort to ecological issues and individual responsibility.

2.1.1 REPRESENTATIONS OF THERMAL COMFORT AND PREFERRED TEMPERATURES

Home heating practices and representations of thermal comfort vary both between and within households. Some participants felt comfortable in higher temperatures and preferred to dress lightly, while others enjoyed the seasonal changes and found themselves more comfortable in warm clothes during fall and winter months. Table 6 shows how different temperatures are considered ideal in different areas of the home. On average, participants consider that 20,81°C is the most comfortable temperature for the living room, while 18,17°C is sufficient for the adult's bedroom. Parents are more careful when it comes to children, preferring warmer temperatures in their bedrooms than in the adult rooms. Children bedrooms should be warmer as adult ones, with an average preference of 19,92°C. In general, our participants were not keen on having very warm indoor temperatures. Most aim at temperatures in which they can be comfortably dressed in seasonal clothes (for example a pullover in the fall or winter), without needing too many layers. Most participants prefer to sleep in colder temperatures, with a few of them explaining that they sleep better and that it is healthier.

For our participants, feelings of comfort are related to many different factors besides room temperature. For instance, humidity is often mentioned as an obstacle to comfort. A room that is too damp will induce a sense of cold, while a dry room will be considered as unpleasant and unhealthy for the respiratory system. How different rooms are used was also evoked. For example, the living room requires higher temperatures because it is a space in which participants are less mobile, usually sitting down when they occupy this room. They also tend to stay in the living room longer. Rooms in which they are more active and don't stay as long, like the kitchen or a utility room, can be kept at lower temperatures. The presence of small children, who play on the floor, also influences the desired temperature in the living room. Even though they are quite active, parents don't want children to get cold while sitting on the ground, and tend to maintain higher temperatures. Bathrooms, in which people have to get undressed, are also expected to feel warm. Individual preferences also come into play when it comes to feelings of comfort. Participants are physiologically different and feel comfortable in various temperatures. They were also raised in various thermal environments, which can influence their preferences as adults, as we will later discuss.

Table 6. ELL participants' perceptions of desirable temperatures in the winter during daytime before taking part in the challenges, in °C
Source: baseline survey, n=35

	Average all	Highest	Lowest	Mean ELL1 (n=19)	Mean ELL2 (n=16)
Living room area	20,81	24,50	17,00	21,14	20,44
Bedroom	18,71	21,00	15,00	19,00	18,41
Children's bedroom	19,95	23,00	18,00	20,46	19,43

Participants from ELL2 seemed to enjoy slightly lower temperatures in comparison to ELL1. They live in an energy efficient, Minergie-labelled building, and mention that there are big differences in terms of temperature and exposure to wind between apartments. Some apartments are easier to heat, while other seem to be remaining colder despite having the same settings. During focus group discussions, many tenants explained that heating people instead of spaces was a common practice, with strategy such as using of blankets being widespread. The fact of living in a Minergie building might have influenced participants' sense of comfort: a feeling of pride to live in a high-performance building was expressed by many of them, as many said how they like to live in an eco-friendly environment. This might explain partly the small difference in perception of desirable temperatures observed between ELL1 and ELL2, the latter preferring lower temperatures. The participants that came to the focus group (ELL2) were all enthusiasts for the challenge, and also seemed to share similar points of view on heating practices. In ELL1, most of the twenty households had similar preferences. However, two of them had very different views, saying that they like warmer temperatures and even though they know that energy savings are necessary for environmental reason, they find it a pity to have come to the point of having to reduce one's comfort to preserve the climate.

2.1.2 HABITS, ROUTINES AND SOCIAL RELATIONSHIPS WITHIN THE HOME

Participants had different heating systems and different techniques for regulating indoor temperatures. Some heating systems functioned with a thermostat set on a desired temperature, others had valves with scaled settings. They would either choose a definite setting or temperature and leave it out of habit, or adapt their settings depending on how they feel, or the time of the day, for example. Some of them who have to live with a more rigid heating system expressed frustration in not being able to regulate their indoor temperature as they would like. A few participants mentioned other factors influencing their indoor temperature and feelings of comfort, such as using carpets or curtains, or keeping the door to cold areas of the home closed.

Table 7 shows how ELL participants adapt their settings in relation to different occasions. The most common practices were turning down the heating when not at home and in unused rooms. An important number of participants usually remember to adjust the heating according to their needs, reducing temperatures when they are not home to avoid wasting energy. Some participants had automated heating system or electronic thermostats that would turn down the heating at set times. Most were happy with such a system. Participants often aired rooms daily for about ten minutes during the winter. Most of them didn't turn down the heating while airing out. They considered it useless and believed it would actually waste energy to warm up the room again. However, some participants who liked airing for a longer time declared turning the heating down. About one fifth of participants turned down the heating during the night in the same way they do in unused rooms. As discussed above, sleeping in colder temperatures was appreciated by many of them, and was often seen as healthier.

Table 7. Frequency of various heating-related practices among the ELL participants in winter-time before participating in the challenges
Source: baseline survey, n=35

	Total (n=35)		**ELL1** (n=19)		**ELL2** (n=16)	
	n	%	n	%	n	%
Turn down heating for the night	7	20%	4	21%	3	19%
Turn down heating when not at home	18	51%	8	42%	10	63%
Turn down heating in unused rooms	17	49%	11	58%	6	38%
Has a program to automatically turn down heating at certain times	8	23%	7	37%	1	6%
Air rooms for more than few minutes per day	6	17%	5	26%	1	6%
Turn down heating when airing rooms	9	26%	9	47%	0	0%

Having guests often had an impact on how people regulated their indoor temperature. Some participants had to increase the temperatures when visitors came by, because they received complaints about the cold. Others had to do the opposite, because their home would quickly warm up when filled with people. Receiving guests overnight often involved turning the heating on in an unused, unheated room. A few participants who reported welcoming (small) grandchildren for just an afternoon or for a couple of days mentioned they would automatically heat more when having them over. The same goes for receiving elderly people, who tend to tell their host when they feel cold and need the heating to be turned up. There seem to be strong social expectations around having a house warm enough for children. The fear that toddlers would get cold, especially when playing on the floor, was common among participants. A few participants living in buildings also mentioned that their own heating habits were influenced by their neighbour's. They explained that they benefited from their neighbour's heat and didn't need to heat their own home much.

More generally, ELL1 and ELL2 households had relatively similar practices, as shown in Table 7. 19% of ELL1 and 21% of ELL2 participants turn down their heating for the night for instance. Habits weigh heavily on how participants regulate their indoor temperature. Only a quarter of them had the habit of turning down the heating at night, and many participants say they just don't think about it. This suggests an important potential for improvement. About half participants in both ELL groups turned down the heating when not at home, or in unused rooms. Curiously, while ELL2 participants are more attentive about turning it down while they are away. ELL1 participants are more cautious about not heating unused rooms. This might have to do with the difficulties to regulate their indoor temperature that ELL2 participants expressed: the heat setting takes quite a while to act on temperature, and in some apartments, it seems to have little effect on it.

Picture 4. Valve to adjust the temperature of the radiator

Therefore, it might be easier for ELL2 participants to turn down the heating when not at home than trying to regulate different rooms.

Airing practices are very different between the two groups. 26% of ELL1, but only 6% of ELL2 participants, air for more than a few minutes a day. Minergie buildings such as the one occupied by ELL2 participants are supposed to be energy efficient and self-ventilating, therefore inhabitants should not open their windows at all. Some still do, but they only air for short periods of time. They know that this is an inappropriate behaviour, and a few participants seem to have a feeling of shame when doing it. This might also explain why ELL2 participant don't turn off the heating while airing out, while about half of ELL1 participants do.

Moving to a new apartment or house often created small changes in the participants' practices. For instance, they would have to adapt to a new heating system and learn to regulate their indoor temperature again. A participant from ELL1 mentioned that he lived in two different apartments in the same building: one was always too cold and he had to use auxiliary heating, while the other felt too warm and he had to open windows. The orientation of the apartment, the heating system, the quality of the insulation, or the heat coming from neighbouring apartments can all account for differences in indoor thermal comfort when moving into a new space, and need to be accounted for when adjusting temperatures towards what people consider to be their comfort standard.

Moving out of the parents' house, or moving in with a partner, can also lead to significant changes, suggesting that social relations have an important influence on comfort, and not just material arrangements. Some participants explain that their parents used to heat very little and that they like warmer conditions. Others say that their parents heated spaces too much, which they find uncomfortable. Nonetheless, an important number of participants felt that their heating practices were close to the ones of their childhood. A few recalled how they were raised to be aware of their consumption and avoid wasting energy, and explained that they kept that state of mind in their adult lives. The environment in which participants grew up usually influenced their adults' practices. For example, two partners used to different thermal environments can have trouble adapting to each other's preferred indoor temperatures. Their different representations and criteria of thermal comfort can be a source of tension between couples, who might need some time to adjust to each other's preferences. The gender of the partner doesn't seem to influence his or her thermal preferences. In some couples, the man likes warmer temperatures while the woman feels more comfortable in colder ones; in other couples, it's the opposite. The influence of childhood practices and the physiological specificity of each person seems to have the biggest influence on the temperature at which they feel most comfortable indoor.

Most ELL participants are aware of the energy issues related to climate change, but they do not necessarily have a deep understanding of what lies beneath this awareness, or what more ecological heating practices could be. Many ask questions during the interviews, to know which practices are "better" – suggesting that they are looking for easy to follow prescriptions that would guide their behaviour, an approach that is distinct from the more deliberative and less prescriptive design of our ELLs. Many expressed the idea that they already lead ecological lifestyles, that they are already careful about their consumption, and wonder why they should be the ones making an extra effort. While most do try to follow some environmental recommendations, there are also many ambiguities in their practices. Some don't realise that there are possibilities for improvement because they have built their own definition of what an ecological practice is. Others try to do their best and to keep being reflexive, but come across difficult decisions and trade-offs. Deciding to turn off the heating while airing out is one such decision for which people are usually unsure of what the best thing to do is. In relation to laundry, many participants had to open windows when they hung laundry to dry in their apartment, otherwise it would take too long to dry, or the humidity rate would climb too high. Taking a warm bath or making a fire in the fireplace were practices participants know they are not environment-friendly, but in which they would indulge anyway. Despite some contradictions, their participation in the challenge attests to their commitment to sustainable consumption and their wish to support the transformation to less energy-intensive consumption practices.

2.1.3 STRATEGIES FOR WARMING BODIES INSTEAD OF SPACES

ELL participants mentioned various ways of keeping warm during the winter, the most cited being to wear more and warmer layers. They used clothes, such as jackets, woollen sweaters and slippers, but also blankets to cover up while they are less active. Drinking hot beverages and eating warmer meals were other strategies to warm the body. Cooking warm meals was linked to having a seasonal diet and didn't stem from trying to heat their homes with residual heat from the oven. Using the heat generated from electric appliances was nevertheless mentioned as a technique to keep warm by ELL2 participants. For instance, a personal computer can feel warm on the laps. A few participants, for whom the feeling of cold is related to being still, explain that they get active to feel warm, by either moving around the house doing chores or by practicing an indoor sport (sex was even mentioned as a warming activity by ELL2 participants). A couple of people explained that they liked taking occasional baths during the winter and would automatically acknowledge that they knew that it was an un-ecological practice, when mentioning it. This strategy is seen as a guilty pleasure by ELL participants. In the ELL2 focus group this practice created humorous exchange between participants. People who confessed taking baths for staying warm expressed a feeling of shame and delight, at the same time. A few participants had fireplaces which they liked to use, even this practice can be quite polluting. These are the kinds of trade-offs that participants have to deal with. They enjoy heating their body using warm baths instead of turning up the heating, but they use an important amount of water doing so. They love the feeling of heat produced by wood-burning, and the fact that they can lower their heating systems while making fire, but also recognize that they generate pollution via the gas present in the smoke.

2.1.4 HEATING SYSTEMS AND ISSUES OF CONTROL

Participants in the challenge had various heating systems, that revealed a variety of thermal preferences. For example, some people enjoy the feeling of walking on heated floors, but others find it unpleasant and unhealthy for the legs. For some, heating through burning wood is considered as providing a more natural and pleasant feeling, as opposed to radiators. Being able to heat one's home with a fireplace is then presented as the most desired option by participants, who tend to leave aside the negative ecological impact of wood burning. Individual representations and social norms are at play in evaluating heating systems and the kind of comfort or feeling they provide.

When it comes to mechanical heating systems, some like being able to regulate indoor temperatures themselves, while others prefer to have it set at a definite temperature, that will automatically adjust according to the moment of the day (reduce temperature at night for example). In all cases, having a sense of control on heating and indoor temperature is very important for participants. They want to play an active role in ensuring their thermal comfort. When participants complained about their heating system, it was usually related to a lack of control linked to more automated technologies. This would suggest that smart home technologies or systems that limit human interventions in microclimate control would not be a preferable strategy. A common problem was access to settings. For some, adjusting the settings was physically complicated, the valves being hidden behind heavy furniture, for example. For others, the heating adjustments were made for the entire building and didn't suit them. Sometimes, the settings created big differences between rooms, or between apartments in the same building. Lacking control on the heating system, participants could not reduce thermal contrasts between rooms, which created frustration. Similarly, a few tenants who had fuel-based systems expressed how they disliked this energy source, but others didn't usually mention their energy sources at all. Participants that particularly liked to be well

Picture 5. An old building's simple glazing window

informed on their heating system could explain their functioning from A to Z, but most only knew the very basic features.

Another often cited issue was poor insulation. Some participants living in old buildings had simple glazing on windows, with much heat loss as a result. This feature bothered participants because of energy waste and heat loss, but also because of the air flows and feeling of cold it created. The same people were also upset that they had no power to change this structural element, being tenants in their building[6]. Some participants expressed their interest in having an energetic analysis made on their apartment, to be able to see how much energy is lost and where. Since 2016, landlords are expected by law[7] to replace such windows with more efficient models, but the law's implementation is being delayed. Even though landlords can incur penalties if they don't conform to the legislation, they can obtain legal delays, which is slowing down the process. Situations in which they can't act on their own comfort create frustration and sometimes discomfort among participants. Some participants live in buildings where electricity bills are mutualised for all tenants, who pay according to the surface in square meters of their apartment. They often dislike this situation, because they feel they are paying for people who are not careful about their consumption and find it unfair.

2.1.5 SOCIAL NORMS AROUND PRACTICES OF THERMAL COMFORT

ELL participants are well aware that social norms around comfort have evolved over time, including expectations around consistent indoor temperatures throughout the day and the year. They are conscious that bad habits can be acquired rather easily, and that it's more difficult to get people who have become used to a certain standard to change their practices towards reduced energy use. A vast majority of participants consider themselves as ecologically conscious and are attracted neither to warm indoor temperatures, nor to the ability of staying in t-shirts through the year. Some do like warmer spaces, but consider overheating as an inappropriate behaviour considering their awareness of ecological issues. Others dislike higher temperatures for both ecological and comfort reasons. For the latter, wearing winter clothes during the colder season is a pleasure. This feeling can be associated with the notion of "thermal delight" as defined by Heschong (1979), who advocates against consistent indoor temperatures through seasons and sealed environments. She explains that thermal comfort is tied to changing circumstances and depends on more than just temperatures. In this spirit, adapting to the seasonal change of temperatures is considered by some participants as "natural" and enjoyable. They would rather wear sweaters to feel comfortable than increase the indoor temperature: they are "delighted" to feel warm wearing thick layers. Some also saw colder temperatures as healthier, explaining than people living in too warm environments get sick easier, sleep less well, and have more respiratory problems.

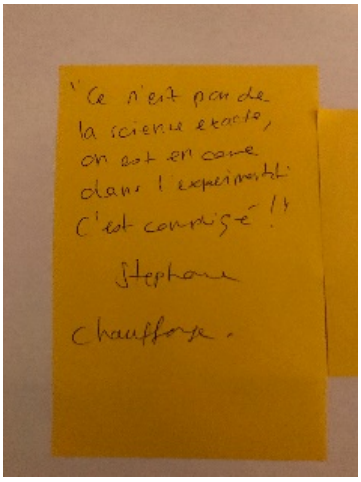
Many ELL participants were already interested in ecological practices before signing up to the challenge. Some explain that they are actively looking for ways to improve their ecological impact in their everyday lives or already do the best they can, based on their existing knowledge. Their practices before the challenge, as well as the changes made during the experiment, were influenced by their ecological awareness. Accordingly, many participants saw a link between overheating spaces and other un-ecological behaviours, placing this practice in a wider frame. They explain that overconsumption expands to many aspects of everyday life, from eating unseasonal fruits to buying too many clothes. They think that most people value their own comfort and desires more than they care about the ecological footprint associated with it. Two participants who reflected on this issue explained that, for some, consumption is seen as a right. To participants, the view of having the right

[6] Deliverable 3.1 highlights the extensive literature on the tenant-landlord relations associated to energy use problematics, pointing out dilemmas such as 'the fact that landlords lack incentives to invest in energy renovations for buildings where the benefits would accrue to tenants or, from the perspective of the tenant, the savings in energy use cannot offset the rent increase due to the renovation' (Laakso and Heiskanen, 2017: 12).

[7] As stated in article 56A of the regulation of constructions and installations, explained in the provided website. https://www.ge.ch/dossier-energetique-renovation-enveloppe-thermique/assainissement-energetique-fenetres

to behave as one pleases, for example the right to wear t-shirts during winter, is shameful. They are glad that they are acting for the environment but are irritated that many people don't seem to care as much as they do. An interesting example related to heating practices is the use of windows. Many participants expressed their frustration in seeing neighbours leave their windows open for long periods of time in the winter. They explain that this behaviour has impacts on others at different levels. First, it reduces the building's energy performance. It can also cool down the whole building, making other residents having to turn up the heating, thus increasing the loss of energy. This waste of energy then represents a wider ecological issue. This frustration is even greater for people that live in buildings with mutualised energy bills. They feel like their efforts, which come at the price of their comfort, are useless, having little to no impact on the environment, but also on the financial gains they might otherwise make.

Picture 6. Note from a ELL2 participant during the deliberation phase: *"It is no exact science, we are still experimenting. It's complicated!"*



When it comes to thermal comfort and heating people instead of spaces, most participants explain that a balance between heating the room or warming up the body should be found. While they agree that living at 25°C during the winter is too high, they think that reaching a threshold temperature is necessary to feel comfortable, even when wearing warm layers. For instance, a participant explains that she would not expect people to feel comfortable at 15°C by just adding on more clothes, but that it is reasonable at 18°C to ask people to put on additional clothes instead of turning up the heating. Striking a balance between heating bodies and spaces can provide comfort while adopting an ecological behaviour. A large number of participants is willing to try to feel comfortable at a lower temperature, but many expressed concerns and doubted they would be able to complete the challenge: an absolute reduction to 18°C, over a four-week period. Nonetheless, they were still eager to try reducing their usual temperature and experience a colder indoor climate. As most participants claim to be already environmentally aware, they are pleased to use the opportunity of the challenge to go a little further in their ecological practices.

2.2 PRACTICES RELATED TO LAUNDRY

Laundry practices are closely related to notions of what is dirty and clean, either based on a mechanical approach to cleanliness, on a more diffuse "feeling", and on the sense of smell. Rhythm and organisation of laundry are strongly determined by material arrangements, mostly the kinds of appliances people have access to, their quality and their availability, as well as the space to pile, hang, or store clothes, towels, or bed linen. In the following pages, we look at routines and everyday life, the skills necessary for doing laundry, the technical aspect, and social norms and representations linked to laundry and cleanliness.

2.2.1 ROUTINES, HABITS, AND EVERYDAY LIFE

While laundry is a highly routinized habit, only a fraction of participants claimed to do it on a fixed day. For those who do wash on fixed days, work schedules are the main constraint and participants do their laundry when they have time, mostly in the evening or during the weekend. The use of a shared laundry room with rigid schedules is also one factor leading to doing laundry on fixed days. Having shared laundry rooms in apartment buildings is quite standard in Switzerland, although this trend is giving way to more and more private machine acquisition. Many participants to the laundry challenge owned a private washing machine in addition to having access to a shared laundry room. This is in part linked to the selection criteria for the study. For a few participants, laundry was usually

done at the beginning of the week, so it would be ready a few days later for the domestic helper to iron and fold. Having guests for a few days or even for just a meal was the main reason named by participants for having to wash more than usual, although one mentioned having more laundry to do at season change (when seasonal clothes are brought out of storage). Needing work clothes was also a reason mentioned for launching a machine. Most households we met live in apartment buildings, and they avoid doing laundry at night because the noise might disturb neighbours, which is not a problem caused by other appliances such as the dishwasher, as many pointed out. Participants often claimed they don't feel laundry is time consuming and they don't experience it as a chore, but as a part of everyday life.

More generally, as detailed in Table 8, data show that smaller households (two persons or less) tend to do around one and a half laundry cycles per week, to iron more (36% of smaller households regularly iron, versus 6% of four or more persons households, and no three-person households), and to use the dryer less. Indeed, only 9% of households with two or fewer persons use the dryer regularly, versus 29% of three-person households, and 41% of four or more persons households. Households from ELL2 did more cycles on average and used the dryer more than ELL1. It might be due to the fact that the ELL2 building boasts a shared laundry facility with large drying machines, while some households also have washer and dryers in their own apartments. The accessibility of the machines may be leading to their increased usage.

Table 8. Laundry practices in different types of households before participating in the challenges
Source: baseline survey, n=35

	Number of people in the household					
	2 or less (n=11)	3 (n=7)	4 or more (n=17)	**Total** (n=35)	**ELL1** (n=19)	**ELL2** (n=16)
Use dryer regularly in %	9%	29%	41%	31%	26%	38%
Does ironing regularly in %	36%	0%	6%	14%	26%	0%
Average number of laundry cycles per week	1,45	2,57	3,91	2,87	2,66	3,13

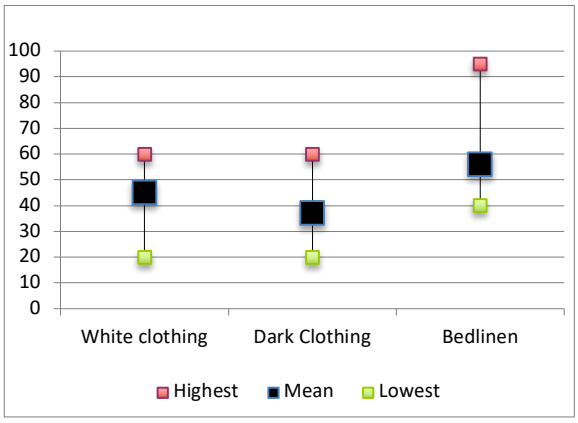
Most people said they are rather flexible and wash mainly when their laundry basket or hamper is full or when they have a full load of clothes for a wash cycle. While they insist that washing full loads goes without saying, exit interviews show that in many cases, this claim was an embellishment of actual practices. The frequency and number of loads depend on notions of clean and dirty, as we will discuss later, but also on sorting strategies. A minority of people don't sort at all and wash everything at the same temperature. Sorting by colours, temperature, and type of fabric, all related factors, are the most widespread techniques. As detailed in Table 9, bed linen, bath towels, kitchen towels, and related pieces are often washed together at higher temperatures (usually 60°C) for hygiene reasons, while clothes tend to be washed 40°C. In some cases, the space available to hang clothes and linen is a constraint that determines how often it is possible to wash. Indeed, many households, mostly in ELL1, don't own a tumble dryer, or rarely use it. Many claimed that tumble dryers are impractical, take too long, or shrink and wrinkle clothes. For clothes that had been worn but were not perceived as being dirty yet, participants usually had a chair, a hook behind the bedroom door, or a clothes valet to put them on. Clothes would tend to pile up in these designated spaces, which could become disorderly. Sometimes, when the pile got too big, people would organise it and put some clothes back in the closet, while other put back clothes directly in the closet after having aired them.

Table 9. Washing temperatures among participants before the challenges, in °C
Source: baseline survey; n=35

	Total (n=35)				**ELL1** (n=19)		**ELL2** (n=16)	
	Mode	**Mean**	**Highest**	**Lowest**	**Mode**	**Mean**	**Mode**	**Mean**
White clothing	40	45	60	20	40	42	60	48
Dark clothing	40	37	60	20	40	37	40	38
Bed linen	60	56	95	40	60	55	60	56

Figure 2 allows us to visualise how there are important differences in washing temperatures for bed linen between participants, and in comparison to white clothing and dark clothing. This also illustrates how concerns around hygiene, which is the main reason for washing at warmer temperatures, are much more important for bed linen than for clothes.

Figure 2. Washing temperature among participants before the challenge, in °C
Source: baseline survey, n=35



2.2.2 COMPETENCIES AND SKILLS

For people trying to wear clothes more than once, two main strategies are put in place: handwashing stains, and airing out clothes. Stains are more often removed on clothes like pants and jackets, with products such as gall soap, scarlet water, detergent, or *Terre de Sommières* (a type of powdered clay, which was part of the challenge kit). Some participants expressed disbelief regarding the removal of stains, saying that “it doesn't really work”, or that it leaves a trace. Airing out happens mostly outside, on the balcony for example, or inside, in the bedroom or the bathroom. Airing out was often used to remove smell, but many mentioned that it doesn't work for everything. Some cooking smells, or strong sweat odours, are said to be impossible to remove without washing the piece of clothing. Many participants recalled airing clothes much more often when it was allowed to smoke in bars, restaurants, and other public spaces. In a small number of households, brushing clothes, wearing aprons, changing when arriving home, and more generally avoiding stains, were strategies adopted to keep clothes clean. Many parents dressed children with dedicated clothes for messy

Picture 7. Sorting, folding and ironing of the family's clothes

activities, or dressed them with clothes that would otherwise have been put directly to wash. Buying natural fibre such as cotton and wool was often put forward as a way to avoid the development of odours that would linger longer on synthetic clothing. Such natural fibres are also said to be less prone to develop odours on the short term, and airing them out is often enough to get rid of undesired smell. They are also said to be more resistant to wrinkles. This is significant because ironing seems to be a disappearing practice. Participants tend to avoid it and say that not ironing saves them time, and many feel they don't have the skills to do it properly. Some developed strategies such as putting clothes on hangers or drying then in a specific way to avoid wrinkles. When buying clothes, some participants try to find organic cotton, or only buy fabrics that can be washed at 30°C. More generally, to reduce the burden of laundry, many said they look for clothes that are easy to care for.

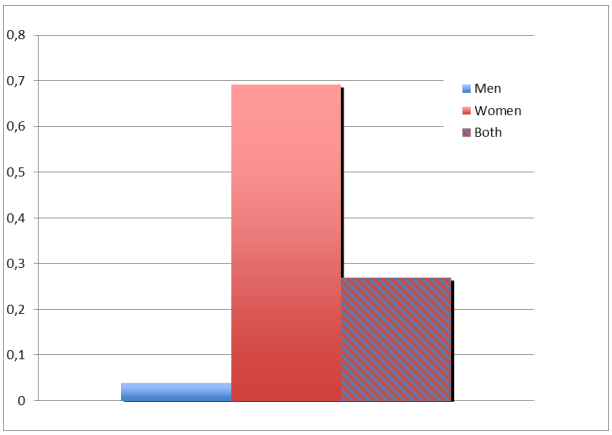


Figure 3. Distribution of laundry responsibilities in households with adult men and women
Source: baseline survey, n=35

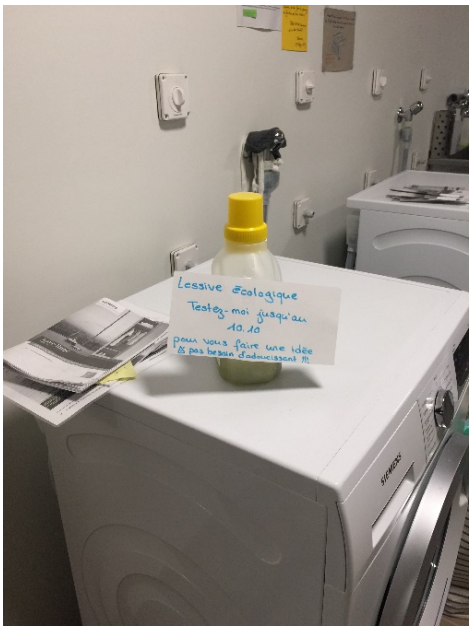
Among the participants in the challenge, doing laundry is still a feminine activity, and women were responsible for washing clothes in the majority of households, as shown in Figure 3. This is in keeping with more general trends on the share of household duties among men and women in Switzerland (Swiss Federal Statistical Office 2019c). In some cases, women would either work part-time or from home, and have more time on their hands for laundry. In other households, the men allegedly don't have the skills to deal with the colours, fabrics, and water temperatures, claim they are not used to doing laundry, or are said to cause “catastrophes”, to use the words of one female participant. In other families, participants say the housework has simply been separated this way. Teenagers or young adults still living with their parents were often involved in helping out with laundry, but mothers still retained the main responsibility.

2.2.3 TECHNICAL ASPECT AND MATERIAL ARRANGEMENTS

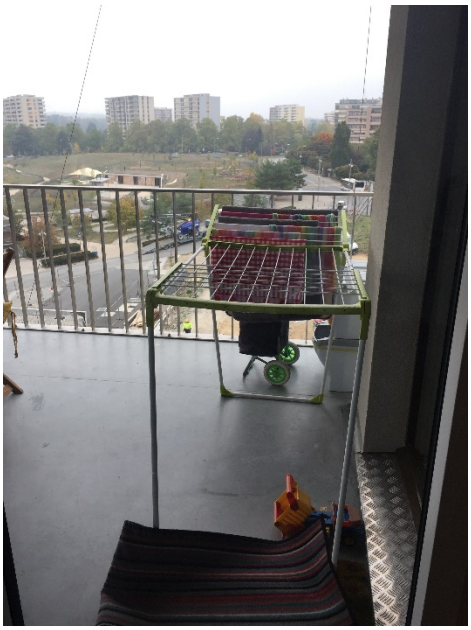
For many participants, the different programmes on their washing machines are quite mysterious, and they struggle to understand the various functions available. There is a lot of confusion regarding the “eco-button”, and why it is, in fact, more environment-friendly. As eco-programmes tend to be very long – up to three or four hours – many participants never use them, or very rarely, because they don't have enough time. Instead, they might turn to quick programmes in the hope of saving energy, thus confusing energy and water efficiency with time efficiency. Others are dissatisfied with the results, saying the eco-programme does not wash properly or wrinkles the clothes. Older machines often don't have an eco-programme. In such cases, people sometimes wash with cold water. In parallel, newer machines are marketed as being *per se* environmentally-friendly. For example, the machines are able to weigh a given load and adjust the amount of water accordingly, and are labelled as energy-efficient. Such machines also don't necessarily offer eco programmes.

The size of the machine plays an important role in influencing laundry practices: as many households try to wash mostly full loads, bigger machines tend to be used less often. In one case, a couple bought a larger washing machine due to the arrival of their first child. Machines size was also named as one of the main reasons people owning a private machine might use the collective laundry room in their building. This might happen when having to wash bigger pieces such as a bed duvet, or bigger loads when coming back from vacation, for example. More generally, shared laundry rooms were used on a regular basis by only a small proportion of participants, for whom it is generally easily accessible (e.g. on the same floor, always available versus only accessible through a restrictive schedule). They can serve as a site of demonstration for new practices (for example, a participant left a bottle of home-made detergent in the laundry room, inviting people to try it) and, for ELL2, as a space for exchanging around the laundry challenge. In the deliberation focus group with ELL2 participants people seemed embarrassed to confess in front of their neighbours and the research team that they own a private machine, when they could be using the shared facility exclusively.

Picture 8. Shared laundry rooms as sites of demonstration. ***"Ecological detergent: Try me before October 10 to make yourself an opinion. No fabric softener needed!!!"***



While sorting and washing clothes are an important part of laundry, drying them seems especially time- and space-consuming. For the practice of drying clothes, we found differences between ELL1 and ELL2 (see Table 8), with a higher proportion of ELL2 households using the dryer on a regular basis. Also, no participant from ELL2 declared not owning or having access to a dryer, as dryers are available in the shared laundry facility of the building; while 6 participants from ELL1 didn't have access to a dryer at all. ELL2 households either use the tumble dryer or hang clothes on the balcony during the summer, while most of ELL1 participants hang clothes in the apartment all year round. This is sometimes challenging, as it takes up a lot of space, and clothes often end up drying in living areas; only a minority of households having a dedicated space for drying laundry. The space available to hang clothes, towels and linen is in some cases a constraint for the organisation and frequency of laundry. Some participants had to open the windows and turn the heating on to make sure the laundry would dry quickly enough to avoid developing a smell, and without having the humidity rate climb too high. As mentioned above, significant proportion of people we met also avoided using the dryer even if they own one, saying that it takes too long, is inconvenient, wrinkles clothes, damages, or shrinks them, with the exception of bath towels, which come out softer after being in the dryer. Using the tumble dryer is also seen as energy-intensive and some people avoid using it for that reason.



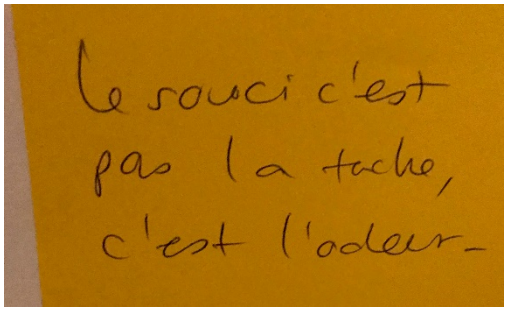
Picture 9. Different spaces for hanging clothes

2.2.4 SOCIAL NORMS AND STANDARDS OF CLEANLINESS

The frequency at which clothes are put in the washing machine depends on norms and representations of what “clean” and “dirty” means. Three main criteria are used: stains, how long clothes were worn or whether they look or “feel” worn, and smell. While all three criteria might be the same, the standards are not: a small stain might be unacceptable in one household, but barely noticed in another. More formal clothing or “clean” work clothes cannot be worn when stained, as it would impair their function. Having a messier profession – such as working in construction or as a cook – and having small children at home make stains acceptable, and clothes won't be put to wash because of this, although people might turn to handwashing. If clothes “look” or “feel” worn seems to be linked to how long participants had them on. For example, a shirt used for two days might more or less automatically feel worn. Finally, smell is an important criterion, especially related to sweat odours but also food smells. How long the smell takes to develop might differ from person to person, but the standard seems similar in most households? The line between clean and dirty is not the same for all pieces of clothes, and a “layer” approach is often put forward. Clothes closer to the body, such as underwear, shirts or t-shirts, will often be worn only once before being put to wash, without a “sniff test” or looking for stains, for example. Pants, wool pullovers, and jackets can be used much longer before feeling dirty.

When it comes to deciding when a piece of clothing is dirty, teenagers seem to have much stricter standards than adults. Most participants explain it by the fact that it is an age at which how one dresses matters to others, and peer pressure is extremely strong (or at least represented as such). Some adults also expressed having experienced peer pressure or been “shamed” at work because they wore the same clothes two days in a row, even if their clothing is not relevant to their tasks. For participants working with people, such as teachers, wearing the same clothes two days in a row was more problematic, although wearing them twice didn't seem to be an issue. Getting older, and especially going into retirement, seems to loosen standards, older participants wearing the same clothes much longer than younger ones without considering them dirty, which they link to the evolution in their daily interactions brought about by

Picture 10. Note from a ELL2 participant during the deliberation phase: “*The problem is not the stain, it's the smell.*”



leaving the world of work. Many of the older participants pointed out how, when they were young, clothes were worn longer because doing laundry was much more work, and they didn't have any other choice. Older women observed how standards and expectations regarding housekeeping got lower over time and see it as a positive development, noting how constraining the norms regarding order and cleanliness were when they were young. With new technologies which facilitate laundering, most of these participants started changing their practices, wearing shirts and layers closer to the body only once and not for a whole week, for example.

Participants all said they don't adhere to the idea of having “sparkling white” clothes, or of such clothes being more hygienic. An image of sparkling white clothes was presented during interviews and focus groups, as a form of photo elicitation to represent images communicated by the detergent industry. Such brilliant white was seen as both impossible and unnecessary to achieve, as even stained linen, for example, can be clean. The smell was described as a better indicator of cleanliness. Some participants avoid wearing white altogether, out of the fear of being stained. In the same vein, wearing dark clothes was seen as a good way to avoid visible stains, and thus could be worn longer.

3. PRACTICES DURING AND DIRECTLY AFTER THE CHALLENGES

Before the challenge, many participants said they already try to have an ecological lifestyle, and believed they don't represent “good” subjects for the study. While most of them did take up new practices and develop new habits, their general feeling is that they didn't turn their life around, or radically changed their habits. Rather, they say they modified or added to existing practices and habits in order to succeed either in the common challenges, or in the challenges they set themselves. As detailed in Table 10, 72% of participants opted for the common heating challenge, with the other electing to reduce temperature at 19-19,5°C, or not going over 20°C, for example. 83% tried to reduce laundry by half, other families trying to reduce laundry without having a fix goal, or to do as little laundry as possible.

Table 10. Share of households signing up for common and/or individual challenges
Source: closing survey, n=29

	Common challenge, % households signing up	Individual challenge, % of households selecting an individual challenge	Examples of individual challenges
Laundry challenge	83%	17%	- Reducing laundry without having a fix goal - Do as little laundry as possible
Heating challenge	72%	18%	- Reducing temperature at 19-19,5°C - Having a maximum temperature of 20°C - Wearing more pullovers and fewer t-shirts

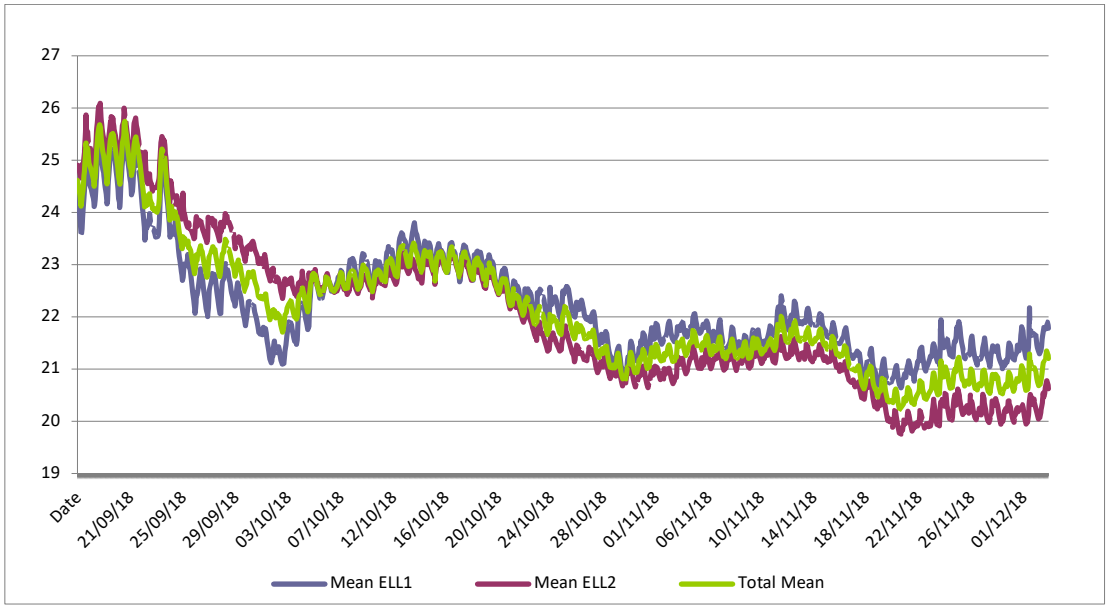
In this section, we look at the transformations in heating and laundry practices in regards to everyday habits and routines, new competencies and skills, material arrangements, and changes in standards and expectations. We base our analysis on ELL1 exit interviews and ELL2 final focus group discussions, a weekly survey designed to monitor changes throughout the challenges, a closing survey sent directly after the challenge, and a follow-up survey completed three months later. Temperatures were monitored with a thermologger, and electricity use of the washing machine for ELL1 households was measured by a wattmeter. For technical reasons, we could not install wattmeters in ELL2 households. We will first examine changes in heating practices before turning to laundry, after which we will look at ruptures in routines and habits and sufficiency potential.

3.1 CHANGES IN HEATING PRACTICES

During the challenge, most participants managed to reduce their indoor temperatures, but didn't manage to reach 18°C, in part due to a very warm autumn in Geneva. This actually created a bit of frustration among participants, who would have liked to really experience how it is to live at 18°C for a month. Other participants found 18°C too cold and settled for heating at a higher temperature, but still reduced from a few degrees compared to their usual habits. Some participants of ELL2 managed to reach 18°C as they live on the more wind-exposed side of the building. A few families had trouble with the heating system during the challenge, which made it impossible to set the temperature as they wished. Either the changes they made to the settings had little impact on the temperature and they didn't really understand why, or it was complicated to balance the temperature because of an imprecise heating system or one where the reaction to change took too long. In such cases, participants had to constantly regulate the settings manually and found it difficult to manage. A couple of participants had more important problems, their heating regulation system being partly or totally out of order during the challenge.

Figure 4 shows the temperature changes before (from September 19 to November 4) and during the challenge (from November 5 to December 3). There seems to be a one-degree change in ELL1 households between November 5 and December 3, the temperature reducing from 21°C to 20 °C during the challenge and on average. The temperature of ELL2 participants' homes also decreases by around 1°C during the time of the experiment. As mentioned above, Geneva benefited from a relatively warm weather this autumn, and that might have biased this quantitative result.

Figure 4. Changes in indoor temperatures before and during the heating challenge
Source: thermologgers, n=35



As a point of comparison, Figure 5 provides data on daily maximum outdoor temperatures in the Canton of Geneva following the measures at the Genève / Cointrin (GVE) weather station. The months of October and November 2018 were particularly warm in Geneva.

Figure 5. Outdoor temperatures in the Canton of Geneva, from April 2018 to April 2019
Source: Federal Office of Meteorology and Climatology MeteoSwiss, https://www.meteoswiss.admin.ch/home/measurement-values.html?station=GVE

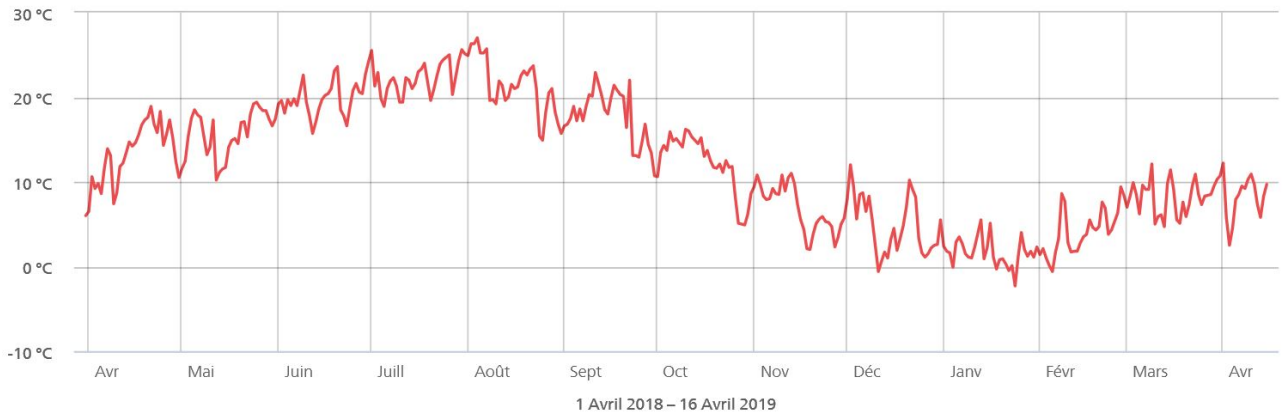
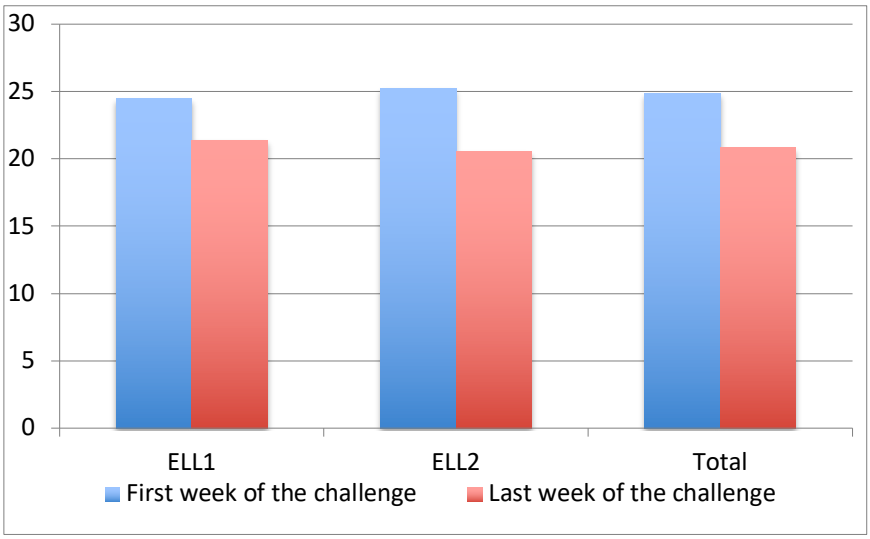


Figure 6 shows the average living room temperature changes in ELL1 and ELL2 respectively between the week of September 19 and the last week of the challenge, on December 3. There is an average difference of 24.8°C for all participants during that period, which can at least in part be tied to changes in outdoor temperatures (see Annex 1), but also shows that efforts have been made to live at colder temperatures.

Figure 6. Change in average living room temperature between the first and the last week of data collection
Source: thermologgers, n=35



3.2.1 STRATEGIES FOR KEEPING BODIES AND SPACES WARM

During the heating challenge, participants developed different ways of keeping warm at lower temperatures. The most common strategy was to wear more and warmer layers. During the day and with reduced mobility in the house (for example, when working from home on the computer), and during the night while sleeping, people opted for wearing warmer or additional clothes. Some started to wear pajamas instead of sleeping in their underwear, others changed their bed linens for thicker ones. During the day and the evening, many just wore warmer sweaters. The socks provided in the kit were very appreciated, and many participants expressed how useful they were, especially to those who used to walk barefoot. Some participants drank more hot beverages, such as the tea and

chocolate included in the challenge kit. A few also mentioned that they used their oven more often, and sometimes left the door open after cooking to recover the residual heat. But this was not a common strategy, and only a handful of participants declared doing so. Many, however, said they use the oven more in autumn and winter months not to warm up the room, but because they try to eat seasonal produces or adapt their menus to the season.

The use of different rooms slightly changed in a minority of families. Some participants were more careful to close their blinds or their curtain at dawn, to keep the warmth inside and prevent the cold from entering. Others kept the doors of colder rooms closed, which was a new habit in some cases. Participants also learned to only heat occupied rooms. They would turn the heating on when entering a room where they would be spending time in, then turn it back off when leaving. A few participants mentioned that they actually changed the activities they do in different rooms, so they could stay in the warmer ones. For instance, a family ate dinner in the living room during the challenge, because they felt too cold in the kitchen, where they ate before the challenge. The feeling of cold also being related to being still, a few participants explained how they tried to move around more when they got cold. A little girl, about eight years old, shared her strategy during the ELL2 focus group, explaining how "Well I dance before going to bed, and that warms me up". She also said how it makes perfect sense to her to heat bodies rather than spaces. In both ELL1 and ELL2, the participants who expressed the most difficulty to feel comfortable in lower temperatures were people working from home. They explained that it was complicated for them because they have to sit for extended periods of times, which makes it hard to keep their body from getting cold. A participant mentioned that she felt fine working at colder temperatures, but that her fingers actually started getting numb, so she had to turn up the heating a bit. A 44-year-old women illustrates: "If you're working from home and you're doing work that doesn't involve moving, you can be cold at 23°, but at the same time when you get home from work you might be hot at 19°C.

The use of windows also changed for some participants. Curiously, some aired less than usual, while others aired more. Participants that aired for shorter periods of time, or less often, did so in order to refresh the air without decreasing the indoor temperature. Other participants changed their practices after having learned that that dry air is easier to heat than humid air. They thus aired a bit more, to decrease the humidity in their homes. In this two-person household, they kept airing out, but changed their way of doing so:

> Really, what changed, what I changed, was how I air rooms. Before, I used to air with the windows wide open for a long time etc. in the mornings. And now I don't do that anymore. So that's what's really changed. I took a good look at the documents, and in the morning, I air the bedroom for 10 minutes and the living room here for maximum 10 minutes too. Whereas before I could very easily leave the windows open for a long time.

Some participants with fireplaces made fires at home to increase room temperatures without using their heating system. In those few cases, it was a practice already in place. Nonetheless they enjoyed their fireplace more often than in a regular year because of the challenge, even though it runs counter to its goal.

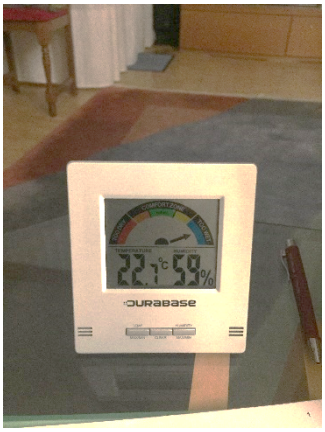
In general, not many new strategies were used by participants. Most of them kept warm in ways they already knew and practiced. What changed is the threshold at which people would opt to increase the temperature instead of trying to keep their body warm. Participants lived in colder temperatures and adapted to them by using techniques known before the challenge, but developed and pushed them further because of the challenge.

3.2.2 CHANGING STANDARDS AND NEW REPRESENTATIONS OF THERMAL COMFORT

For a vast majority of participants, an indoor temperature of 18°C was too cold to feel comfortable. Nonetheless, the challenge allowed them to test the limits of their sense of comfort. A lot of participants found that they could be comfortable at lower temperature than they expected. They lowered their usual temperature by one or maybe two degrees, and were surprised to feel just fine as a result. They often noticed how they slept better. A participant who preferred to dress lightly in warmer interiors also explained how he learned to feel comfortable by wearing warmer layers. A 29-year-old woman who enjoyed being barefoot a lot had to use the slippers and socks because the floor got too cold, and she got used to wearing them:

> Yeah, the big socks. I hate wearing socks. I spend my life in bare feet, everywhere. If I can be outside in bare feet, then I'm outside in bare feet. So that [emphasis on that] was difficult for me, because the floor was really a bit cold (…) I tried to put out 2 or 3 extra rugs. But I… I hate going around in socks, and now I've really got used to, well, to… to putting on socks or slippers so I'm not as cold. So that's something that… that's the challenge that… really made me turn the corner let's say [small laugh]."

Participants became aware of the several factors that can influence thermal comfort. Temperature and humidity were frequently assessed by participants with the thermometers installed by the ENERGISE team and hygrometers they might privately own. In general, people were more attentive to the way they feel at home. Some participants noticed the impact of weather more than they used to, others were made aware of the insulation of their dwellings, observing how the indoor temperature varies during the day. They also noted how being active influences the feeling of warmth. This new awareness led participants to reflect on their practices. They questioned their own sense of comfort, a few mentioning how quickly one can get used to new comfort standards. For instance, a couple of two young adults with a two-year-old daughter explained that they now felt too warm while visiting friends or at public spaces: "We're aware now that heating less is better. Now we're the opposite, we find it hard to put up with rooms that are too hot." A few participants of the ELL2 group mentioned that they only wore the socks provided in the kit in the beginning of the challenge, because they then got used to the floor temperature and didn't need them anymore.



Picture 11. Assessing the indoor climate with a thermometer and a hygrometer

Throughout the challenge people were able to expand their comfort zone. It also made some participants feel more grateful about their usual heating conditions: the experience made them realise how thermal comfort should be appreciated. A participant explained that her husband, who has to wake up really early in the morning to go to work, found it difficult to get out of bed in such low temperatures, and recognised how glad he was to be able to feel comfortable in his bedroom in the morning, now knowing how difficult it would be without proper heating.

The participants, in addition to assessing their own sense of comfort, were also able to compare it to other people's preferences. A few participants mentioned that the challenge made them see how subjective thermal comfort is, how it can differ greatly from person to person. As this 56-year-old woman explains:

> A neighbour did say to me "Oh, you know, we've got problems with the heating again, in the living room it's 22, it's cold" and so I looked at her in surprise and I said to her, "You know at mine it's 19" (laughs), so that's where you see that some people are cold at 22 degrees so we're not all made from the same mould when it comes to the temperature we're comfortable at...

In a few households, the challenge was a source of tension. In one ELL1 family, it sometimes created small discussion or even debate in between family members. ELL2 participants shared their

differences within their own family and with other households of their building. They were pleased to discuss their experience during the focus groups, but also during informal gatherings or on the Whatsapp group created for building residents, or the one created by the research team. Some interesting dynamics were exposed. Families with teenagers explained that it was sometimes complicated to make them participate in the challenge, because they want to manage their own comfort. A similar attitude was observed during the laundry challenge. Other households in which partners had very different thermal preferences had trouble agreeing on a temperature setting. For instance, in two families with small children, one of the parents was pleased with lower temperatures, while the other found it too cold for the children. This situation created debate among the couples, who had to address the perceived well-being of their children along with their different thermal preferences. This is the case of this household from ELL1 with two small children:

> So, he, um… every time he went into the children's room, because the children's room is about one degree lower (than elsewhere in the home) if we don't increase the heat… um, it was 18.5 for example, and well he was saying, "but it's too cold". And I was saying, "but they are sleeping really well, our children, and they are all covered up so it's really no worry" (…) So he was more reticent, saying that it was too cold. [Interviewer asks if the children slept better.] Yup, they slept better!

The challenge allowed participants to reflect on their sense of comfort and the related social norms. While most were unhappy at 18°C, they were able still able to reduce their temperature of a few degrees during the challenge without being uncomfortable. In some cases, the challenge even inspired participant's friends or neighbours to try and reduce their indoor temperature (or their laundry cycles) as well. During one of exit interview, the neighbour of a participant passes by and explains that she decided to turn down the heating after having discussed the challenge with the participant.

Most participants said that they will continue to live in the reduced temperature. Two of them don't believe it is possible for them to change their usual practices, but already used to live in quite cold temperatures. In general participants found themselves comfortable between 19°C and 20°C. These numbers are slightly lower than the ideal temperature declared before the challenge (as seen in Table 6, the preferred temperatures were 20,81°C for the living room and 18,71°C for the bedroom). In the end, a vast majority of participants express their willingness to continue to heat less than they used to. Some even mentioned that they thought about buying carpets or curtains to better insulate their homes in order to be able to keep reducing their heat-related energy consumption.

3.2 CHANGES IN LAUNDRY PRACTICES

In both ELLs, participants didn't succeed in reducing their number of laundry cycles by half but, after three months, they launched significantly fewer machines weekly than before the challenge, as we can see on Figure 7. The reduction is especially important in ELL2. While the number of laundry cycles climbed between week 6 and week 8, during the last week and right after the challenge, participants managed to do about one cycle less than before the challenge.

Figure 7. Average number of laundry cycles per week before, during, and after the challenge
Source: baseline, weekly, closing and follow-up surveys, n=37, 35, 29, 23

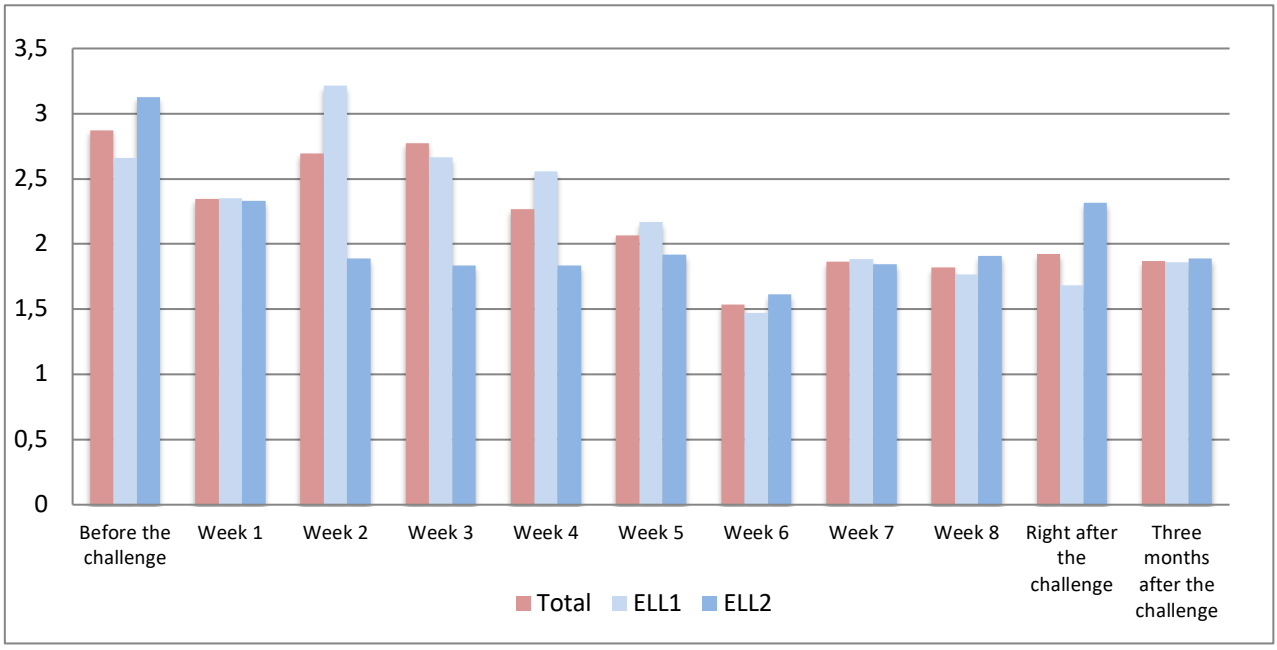
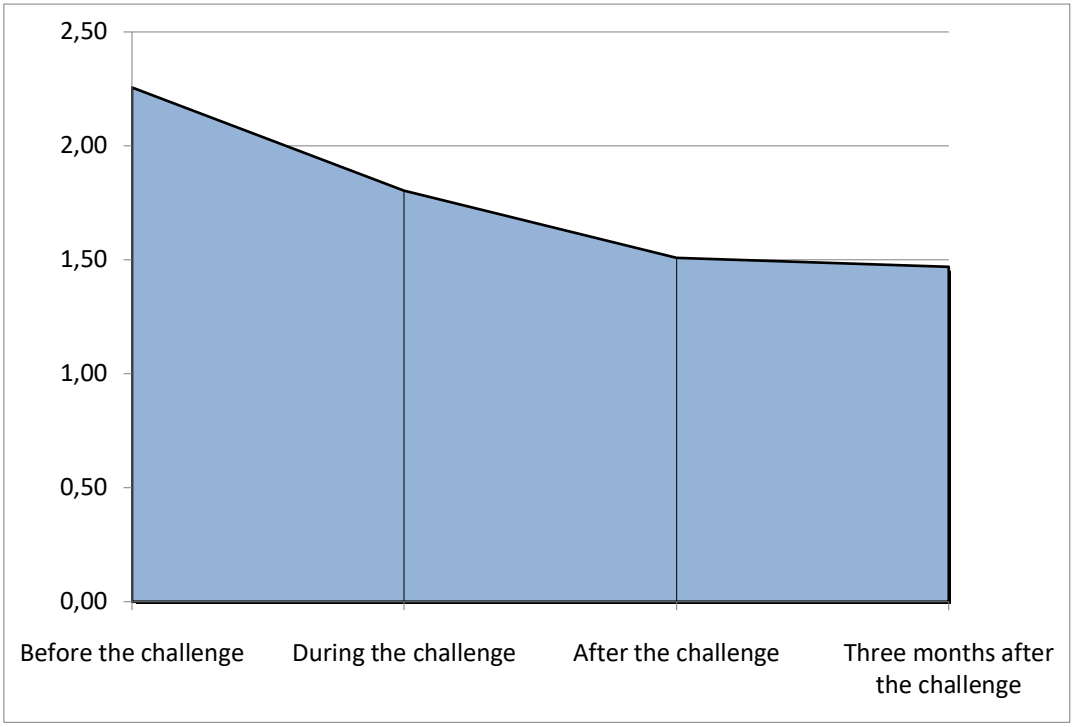


Figure 8 shows how the diminution in the number of weekly cycles led to a steady reduction in energy consumption, which goes down at every step of the challenge (before, during, directly after, and three months later).

Figure 8. Weekly electricity consumption for laundry appliances before, during, and after the challenge, in KWh
Source: laundry diaries, n=35



3.2.1 CHANGING EVERYDAY HABITS AND LAUNDRY ROUTINE

Exit interviews and focus group discussions allowed to paint a more detailed portrait of how practices changed and the strategies put in place to actually reduce the amount of laundry cycles. In terms of habits and routines, the challenge seems to have disrupted well-established practices, such as automatically putting the clothes worn during the day to wash without thinking about it. Here is one woman, 32 years old, living with her husband and her two children both under three years old, describing her experience:

> At the start it was really hard, because I was doing almost one washing every second day. And then near the end we got into a routine, where we… well it took a while to stick, but then we didn't wash things, we aired our clothes more and put them on again more often. Now we all have house clothes, we all have house clothes.

One of the main effects of the challenge – to reduce laundry cycles by half over a period of four weeks – is that it brought people to wear clothes longer. Participants would take time to examine the clothes at night, look if there were stains and if they could be washed, or if they smelled and should be aired out. They would store the clothes they wore that day on a chair, on a hook or on a valet, to pick them up the next day or a few days later. Many participants preferred alternating clothes rather than putting them on two days in a row, in part to avoid people noticing they wore their outfit more than once. Putting clothes back in the closet seemed to have been an especially successful strategy because taking them out of the closet would give the impression that they have been washed, as explained by this 51-year-old woman: "The fact that you put them back in the wardrobe gives you the impression you're taking out clean clothes: you forget you haven't washed them!". One participant went a step further and re-organized her closet to have clothes that were already worn in a specific section. Interestingly, while almost all ELL1 participants said they managed to wear their clothes for two or three days, most ELL2 participants said they didn't manage to do so.

In one household, wearing clothes longer meant abolishing a long-established rule aimed at making sure the four children of the house would change clothes often enough, which was not relevant anymore since only one child, who is now 17 years old, is still living at home:

> […] actually, I had put in place a rule at some point and that the rule didn't make much sense anymore, since our family dynamic has changed and now it's more… and so it was quite amazing for me to realise, in fact, I've continued to follow a rule that I put in place 20 years ago: this idea of changing clothes every second day. It's true that when they were… when they were all between 4 and 10 [her children], at that age they get dirty really quickly, and they don't want to shower, or to… and then at some point, I said "this is what we'll do", it's easier, and then you'll learn a bit to stop putting on dirty jumpers etc. (laughter). And then, in the end, we got stuck with that, when in actual fact as they grow up they're actually less likely to get dirty and then… But stupidly (laughter)… once there's a rule I just stick to it, and then don't think about it anymore. But it's nice to have time to think, and then to realise, well yes, that doesn't make sense nowadays.

Next to wearing clothes longer, participants mainly tried to do fuller loads with dirtier clothes – even those who said they already did full loads – and to wait longer before doing laundry. While this involves wearing clothes more than once, some people also had to dig deeper in their closet, which sometimes meant wearing pieces they don't like. Other had to buy socks and underwear because they didn't have enough to carry on between wash cycles. Pets were a barrier to doing less laundry, with a cat urinating twice on the bed – putting the success of the participants in achieving the challenge at risk. A child in potty-training also made it difficult for a young family to diminish the number of cycles. Many participants mentioned that the amount of laundry depends on the season and that there is less laundry to do in winter, while season change can produce extra cycles.

While most people didn't feel the challenge turned their habits and routines upside down, one household, made up of a 35-year-old woman, her 48-year-old husband, and their three children under eight years old, experienced a particularly strong and positive rupture. In this family, the mother, who is responsible for all the laundry, used to launch one machine a day, doing many small

loads, wearing clothes only once even if they are not dirty including for the children, and separating everything – colours, darks and whites, baby clothes from adult clothes, or bed linen and towels, for example. During the challenge, she stopped sorting out clothes, would make sure they are used as long as they were not dirty, and did mostly full loads. She says:

> At any rate, I learned that you don't need to sort your washing that much, there's no need to do lots of wash cycles and end up washing lots of clothes that aren't necessarily dirty, there are other solutions: airing them, removing the stains, to be honest, I wasn't doing all that before. I really learned something, I think, in terms of washing.

In this family, the challenge really allowed to experience new ways of doing laundry and to reflect on notions of clean and dirty, while taking a load off the mother's shoulders (pun intended).

To succeed in the challenge, a good coordination between all family members was essential. For example, one man subscribed to the challenge but as his wife does all the laundry, so no real changes in practices occurred. Another family experienced tensions in everyday interactions, as explained by this ELL2 participant, mother of three children:

> I found the laundry challenge quite stressful for my relationship with my daughters, because airing my clothes and not washing them after just one day's wear is something that I've always done and is not an issue for me. I felt I was legitimised in doing that and in insisting that my daughters were careful not to stain their clothes, but at the same time it was a kind of constant struggle and I kind of always had the impression that I was the laundry police.

In many cases, however, participants were surprised and happy to see how well all family members participated, in some cases even leading to teenagers starting doing their own laundry – which is not necessarily in the spirit of the challenge, but is a positive development for the parents.

3.2.2 ACQUIRING NEW COMPETENCIES AND SKILLS

One of the key aspects of the laundry challenge was to manage to wear clothes longer without feeling dirty. To achieve this, many strategies were put in place such as airing clothes, which was already done by some participants but was taken up in other households during the challenge. This practice is linked to the habit of smelling clothes to know if they are clean or dirty, and is mostly a way to reduce smell. Many participants also learned new ways of removing stains, such as brushing clothes or using the *terre de Sommières*. A man would use the *terre de Sommières* to clean shirt collars at night, and would be able to wear his shirts one or two more days. Changing clothes when arriving home was also taken up by a small number of participants, along with avoiding stains by wearing an apron in the kitchen. For one participant, a 29-year-old man living alone who was very committed to the challenge (he managed to do only one cycle over the four weeks), avoiding stains was a key strategy, and meant changing some of those small gestures we do without ever realising it:

> Participant: The main strategy I put in place, as I was saying to [a colleague], is to get fewer stains on myself.
> Interviewer: Yes (laughter).
> P: It's really to try to be more careful, not to rub my hands on my trousers all the time, put on overshoes when I cycle, my rain trousers which also prevent splashes, stuff…
> I: …splashes
> P: That way, it stays clean for longer.

As most teenagers in families taking part in the challenge showed little motivation in diminishing their amount of laundry, they developed few new skills beside airing out pullovers, beside the small number who started doing their own laundry, as mentioned above.

3.2.3 MATERIAL ARRANGEMENTS AND USE OF THE WASHING MACHINE

Picture 12. Adapting the settings of the washing machine

Beside wearing clothes longer and washing less often, reducing the number of laundry cycles also implied using the washing machine in new ways. As described in this report, at the onset of the challenge, most people didn't know exactly how their washing machine work, what the different programmes are, or what they are for. There was a lot of confusion with the eco-programme, most people wondering how it can be less energy-intensive if it takes so much longer (at least one hour more than a regular programme), or mistaking the short programme for the eco-programme. Only after discussing with the ENERGISE team, studying the washing machine handbook, or observing the wattmeter, did they grasp the role of spinning speed and water temperature on energy usage, and they could realise how having clothes soaking longer in soapy water was as efficient at removing stains and smell as was washing at higher temperature, for example. At the end of the challenge, some participants shared their intention of studying their washing machine handbook.

Many participants who observed the difference water temperature makes on energy consumption and who are aware that washing at 30°C or 40°C is enough for most clothes, even quite dirty, still resist the idea of washing at lower temperatures. Some find it non-hygienic, especially for towels, socks or underwear, while others have the feeling that colder temperatures wash poorly and don't get rid of stains and smell. This is the case for this 50-year-old woman:

> … my impression is that things aren't washed either. Because the temperature is lower, and I've always been told that some things should always be washed at least 60°… like the bed sheets, towels and so on, and the fact that you just wash them at 30° instead… […] Well, there you go, maybe I'll have to carry on for a bit longer, until I get used to that idea…

Some people already used home-made detergent, or started using laundry balls or Marseille soap chips during the challenge, and wonder if clothes would come out clean if they used these more ecological solutions with colder water. Related to this, in Geneva, the "zero waste" movement is taking off, with various workshops on how to make your own household products, including detergent, being offered. In this spirit one ELL2 participant shared a recipe of detergent over the building WhatsApp group.

Doing full or fuller loads was not a problem for a majority of people, who didn't see an impact on how clean the clothes would come out. Often, having enough clothes to fill up the washing machine meant sorting out less, mixing together bed linen with clothes, or bright and dark colours, for example. This new habit seems to have been taken up without any particular difficulty. To make sure to get enough clothes to do full loads, some people got extra clothes hampers or put some in the children's room, with the idea that if laundry can become "out of sight" in this way, it will not need to be washed as regularly. Washing more clothes at once also meant having to dry more pieces at the same time, which sometimes led to difficulties related to the lack of space to hang the extra laundry, as experienced in this family of four: "And maybe another thing is that because the washes are larger we also reach capacity with…drying. Well it means we are forced to be using two [racks], so it becomes quite significant in terms of the surface used for drying". Some participants found new ways to hang clothes and managed to iron less, or used the dryer less and hanged clothes more. For some, hanging clothes were seen as too much of a burden in terms of time, but also the space it might take in the apartment, as it is the case in this family of four: "Yes, well this wasn't about the tumble dryer, but to be honest I'm just not ready to hang out my clothes in the flat, that's the issue, that's going too far, at the start I tried not to use it but it's just not possible". Finally, only one household started washing at night, either because people didn't know if it actually is cheaper, because it is not convenient for them, or out of concern for the neighbours that might be disturbed by the noise.

3.2.4 CHANGING STANDARDS AND EXPECTATIONS

In the deliberation interviews, most participants said they didn't consider laundry as being time-intensive. However, after having completed the challenge, many noticed how much time and effort they saved without changing much in their daily lives and plan on keeping at least some of the new habits, such as airing clothes or wearing them longer. Most also want to keep on doing less laundry, because of the relief it offers. Young parents said that even though they might have saved time on laundry, they didn't notice it, as the freed-up time was quickly swallowed up by other tasks. However, many women expressed how great it was to be free of the stress and the mental load created by the never-ending laundry pile. Coming from the French-speaking feminist networks, the notion of mental load (*charge mentale*) refers to the thoughts and energy spent over the day on the planning and organising of the household's everyday life, for example planning meals during transit, coordinating the various children's activities, or reminding their partner of the chores they have to take care of. This mental load is said to create extra pressure on women and to take up mental space that could otherwise be dedicated to paid work or other activities. This mother of two children under 10 years old attests: “For me it takes a load off, a mental load, I didn’t really notice whether or not I saved time, but not having a huge pile of laundry stressing me out because it needed done made me feel freer”. But this was not the case for everyone: in one household, the mother of two young children says she managed to reduce the number of laundry cycles by two, but found it stressful and time consuming, especially handwashing stains and thinking about filling the diaries.

Many participants felt that having to wash less and wear clothes longer allowed them to distance themselves of social norms they ended up finding very constraining. Moreover, many interviewees said that they didn't feel dirty or uncomfortable wearing clothes for a second or third time. As a 31-year-old woman puts it, “People don't know!” that clothes are worn again. For older participants, the practices they had to put in place in order to reduce the number of laundry cycles were not entirely new, but reminded them of their childhood, when much more work went into doing laundry because their mothers didn't have an electric washing machine and did everything manually, for example.

Participants in ELL2 took part in the challenge as a community. This allowed especially rich exchanges on social norms and notions of clean and dirty during the focus groups, but also in their daily interactions in the building. However, some households felt pressure to participate in the challenge, which can be seen as a downside of turning to a “community of place” to put in place such an experiment. Similarly, for people using the shared laundry room, there was an added pressure to “do well”. As a consequence, the more negative aspects of the challenges come out much more clearly in the ELL2 focus group than in ELL1 interviews. This might suggest that it would be more effective to recruit people in a community of interest, rather than a community of place, for future experiments based on sharing experiences. Despite these issues, in both ELL1 and ELL2, most participants said they will keep at least some of the new practices they put in place during the challenge and will keep on doing less laundry. As we will see in section 4.2, many did continue to delay washing clothes and reduce their number of weekly laundry cycle over the longer term.

3.3. POTENTIAL RUPTURES AND SUFFICIENCY POTENTIAL

In this section, we draw on exit interviews and focus group as well as the weekly, closing and follow-up surveys to explore the ruptures in practices that have been brought by the challenges, as well the potential for sufficiency – or an absolute reduction – in energy consumption. We will see that tools making energy visible, such as thermometers or wattmeters, had an important impact in creating a reflexive stance among participants. Similarly, for many, the deliberation phase was the occasion to critically assess their practices before attempting to transform then. A better understanding of heating systems and laundry machines also impacted consumption. Most importantly, allowing the participants to experience other ways of living, lead many to rethink their habits and standards in relation to thermal comfort and laundry, leading them to realise that they can actually gain from consuming less, in terms of time and money, for example.

3.3.1 DELIBERATION INTERVIEW AND CHALLENGE KIT

For both the heating and the laundry challenges, the deliberation phase was one of reflexivity, during which people observed their own practices and habits without trying to change anything. Before and during the challenges, the diaries were a precious tool for people to gain some understanding of routines and habits for laundry, and their sensations in terms of thermal comfort, as told by this 67-year-old man: “having the thermometers in the three rooms, the fact that we took the readings, that allowed us to realise that, well, I didn't have the faintest idea what the temperature was in each of these rooms”. Some saw this enhanced reflexivity as a rupture in itself, becoming aware of what is otherwise done without further questioning. Others said the deliberation phase was essential and they would not have managed to go through the challenge without first being able to observe their own routines and habits with the intent to change them: “And it's true that I think I would not have been able to go to do the challenge immediately. That's impossible. The fact of already looking a bit at how what you are doing things etc., allows you to get into the challenge a bit more like a game”.

The deliberation interview and the challenge kit were appreciated for various reasons: some found the objects useful, allowing them to discover or rediscover practices such as brushing clothes, while other found it fun to open the kits, drink the hot chocolate and put on the socks for example, or saw the objects a reminder during those eight weeks or as a pretext for discussing the challenge with other household members. A few participants didn't really use the objects in the kit, or gave them to their children and neighbours. The deliberation interview and focus group allowed to enter the observation phase of the challenge with a fresh view of social norms around comfort and cleanliness, and a better understanding of the technical aspect of laundry and heating.

3.3.2 UNDERSTANDING THE MATERIAL INFRASTRUCTURE

One of the most significant impacts of the challenges was to make energy visible, through the thermometers and the wattmeters. This allowed participants to see for themselves how much energy they use while doing laundry, and what it means, and to match bodily sensations (warm/cold) to numbers. Many found that they often felt cold and went to look at the thermometer to see that the temperature was the same earlier when they felt comfortable. This also goes the other way around. Regarding the decoupling of feelings of warmth or cold and the actual temperature, a 55-year-old woman wonders: “more generally, if you spent your life without a thermometer, then you'd think the temperature was fine and then if you realised it was actually 17°C, then you'd think, 'Oh, that's terrible!' [Laughs]”. Many participants started looking at the temperature when coming into a room as an automatism.

Picture 13. Different strategies to make energy visible

Engaging in both challenges also meant gaining a better understanding of the washing machine and the heating systems. Some discovered new programmes and options on their washing machine or gained a sense of which elements of a programme take up the most energy, while others got to see more hidden parts of their heating systems, which are often mysterious, especially for tenants:

> I went to ask [the owner] to turn down the heating, so that meant I explained it [the challenge] to him, and it turned out really well. After that he was like, "Why don't you come and see?" I was with my elder daughter, and we were able to go and see the boiler, we saw the big fire below it, he showed it to us, because it's on the ground floor, I mean it's in the back courtyard, it goes down, it's like a kind of small conveyor belt which feeds wood chips into the boiler, and so then we went to see the boiler, very impressed by all of that, and in the end it's great, because it's them who installed it all themselves, it's really great.

All ELL2 participants and some ELL1 participants have an underfloor heating system they don't understand very well, and the challenge was an occasion to get more familiar with its functioning.

3.3.3 BECOMING AWARE AND REFLECTING ON SOCIAL NORMS

More generally, both challenges raised awareness among participants and their families on the impacts in terms of energy consumption of their everyday practices, and most of them seem committed to keep trying to consume less. It also led people to think about other practices that might be energy intensive, such as using small appliances and electronic devices:

> So, we had to think about the other electronic devices that we use. So, there's a kind of… Well, at the moment, we haven't reached any decisions, we haven't really changed our habits, but we have become aware of that [electric consumption of devices]. Including the hoover – when it's just a small area, we sweep it now. We don't have a lot of rugs and carpeting, but we've kept using the hoover for that. But we've tried to think a little bit about the other electronic devices, about what might be…

Participants also told how, following the challenges, they modified their practices in relation to cooking and using the oven, showering, using the dishwasher, taking the bike instead of the car, or even flying. These are some of the positive rebound or spillover affects of the heating and laundry challenges.

Regarding social norms, many realised that it is possible to respect social norms (or their representations of such norms) in terms of cleanliness while lowering their personal standards, by wearing a shirt two or three times, for example. For some, it meant developing a new vision of hygiene, or experimenting with what it means to be clean or unclean. Through the challenge, we researchers gave people permission to do something different in a bounded space and time, and the time we spent with them in discussing their practices at the onset made them feel all the more committed to "doing well" (which we had explicitly said was about learning, not just reducing energy). For example, a woman took on showering less. She also realised how practices related to laundry and heating are linked to every aspect of our everyday life, telling her interviewer, with a touch of humour:

> - I personally spend many hours of the day reflecting, thinking about (name of researcher from UNIGE) and her…
> - Ah yes…
> - I have have become…our obsession, well, when I am dressing up I am thinking about you. When I am cooking I am thinking about you. When I take my apron I think about you. So… [laugh]…

On a more pragmatic note, a 39-year-old man with two small children at home explains how they sleep better in colder temperature, and how the challenge had a positive impact on their health and general well-being:

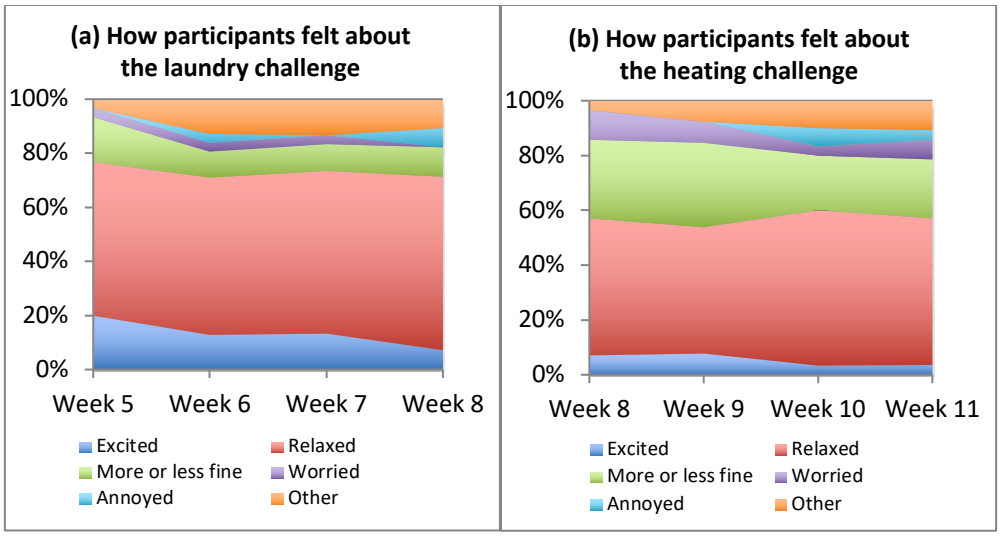
> And then well, personally, I think the heating had a real impact on me (…) it's even positive in terms of comfort actually. Because the kids sleep better, you sleep better when it's not too hot. And then… and then when I go somewhere I think, "God, it's boiling here" [laughs]. And in winter, for colds and illnesses it has an impact I think, I don't know if I would say we're less susceptible… you're not as cold when you go outside either because of that…

Among other impacts, some teenagers interested in the challenge started doing their own laundry and kept an eye on the laundry practices of other members of the household, to make sure clothes

can be worn more than once and that the washing machine only runs when full. In relation to norms, standards and practices, more informal interactions between ELL2 participants took place around the heating challenge than the laundry challenge. Most discussions about laundry happened in the shared laundry room only used by a minority of participants, while all of them share the material infrastructure that supports their heating practices.

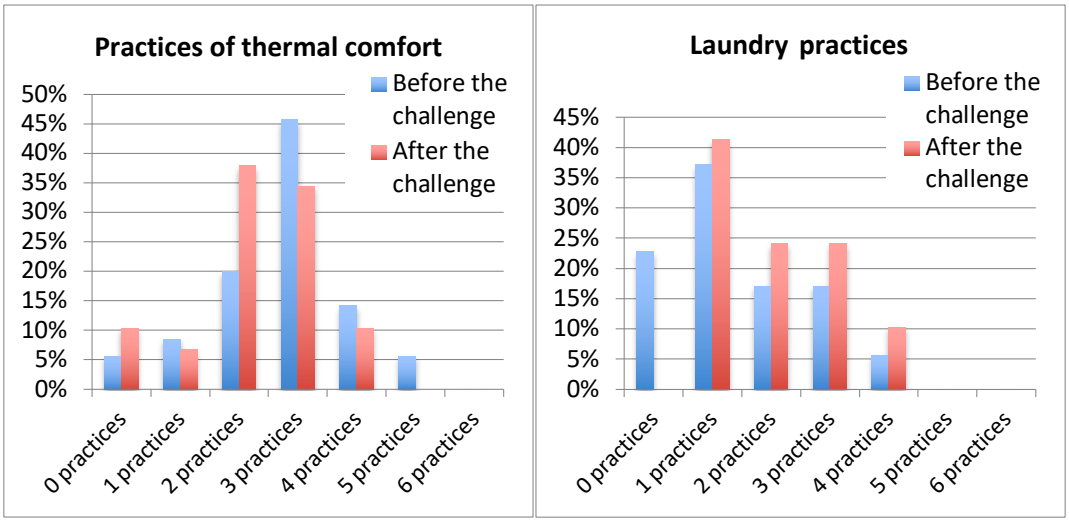
Through the weekly surveys, we monitored how participants felt about both challenges. As we can see on Figure 9, during the whole duration of both challenges, more than half of participants said they felt relaxed, or even excited. The share of people declaring to be “more or less fine” is much larger for the heating challenge compared to the laundry challenge, but diminishes towards the end of the fourth week, with more people reporting feeling “relaxed”. The share of people reporting feeling “worried” is also diminishing over time. For the laundry challenge, almost 20% of participants declared to feel “excited” at the beginning, but their enthusiasm faded out, people becoming much more “relaxed” than “excited”. This can be an indication of new habits settling in and the challenge becoming less visible among other everyday practices.

Figure 9. Feeling of participants during both challenges
Source: weekly surveys, n=35



Three months after the challenges ending, most participants kept at least two, sometimes three or four practices that are part of reducing energy consumption, as shown on Figure 10. While there has been a significant increase in the number of adaptive laundry practices, compared to adaptive practices of thermal comfort, people seem to implement fewer practices after the challenge than before. This might be due to an overestimation of their practices by participants when filling the baseline survey. The baseline survey was filled in September, when outdoor temperatures were still quite warm, and the closing survey in December. It is possible that participants offered a more realistic portrait of their practices when actually having to ensure their thermal comfort through heating, and not trying to remember habits from the last winter. Data from the follow-up survey show that examining clothes carefully to see if they need washing, storing slightly used clothes in order to reuse them before washing, turning down the heating in certain rooms, and wearing extra clothing, socks and slippers to stay warm are enduring practices through which participants can keep going with a reduced energy consumption in relation to heating and laundry.

Figure 10. Changes in the number of adaptive practices related to thermal comfort and laundry among participants
Source: baseline and closing surveys, n=35, 29



Interviews and focus groups showed that the deliberation phase played a key role in inducing ruptures in practices, as it was the occasion for participants to observe and better understand their habits before transforming them. Being able to visualise energy consumption was also very important, as it allowed people to understand how they use energy and to see for themselves if they managed to reduce their consumption or not. Just making the experience of alternative energy consumption practices and of their eventual positive effects seems to open the way towards sufficiency, as the challenge also led participants to think about what they could change in other areas of their life to achieve an absolute reduction in energy consumption.

4. PRACTICES A FEW MONTHS AFTER THE CHALLENGE

This section explores if and how both challenges induced lasting transformations in practices, and if they had an effect on notions of thermal comfort for the heating challenge, and of clean and dirty for the laundry challenge. These observations are based on data from thermologgers, and on a comparison between the results of the baseline, the closing, and the follow-up surveys, which was administered three months after the end of the heating challenge. Answers to questions about the socioeconomic impacts in the follow-up survey also offer insight in opportunities for scaling up and on spillover effect.

4.1 PERSISTENCE OF CHANGES IN HEATING PRACTICES

The ENERGISE heating challenge contributed to a reduction in participants' indoor temperatures. During the challenge, they were able to lower their temperatures by heating less and finding other ways to feel warm and comfortable at colder temperatures. In Table 11. we see that, on average, the reduction of temperature between the first and the last weeks of the challenge was of 4,05°C. The fact that it was quite warm in Geneva in the beginning of the challenge might explain the relatively high temperatures of the first week, and might have biased the amount of actual reduction. Nonetheless, participants from both ELL1 and ELL2 have decreased their indoor temperatures (going respectively from 24,5°C to 21,39°C, and from 25,22°C to 20,55°C during the four weeks of the challenge). Table 11 also provides information on how the participant's practices evolved after the end of the challenge. In both ELL groups, the temperature continued to go down after the challenge, reaching an average of 19,31°C at the time of the follow-up survey, which represents a one-and-a-half-degree drop in comparison to the last week of the challenge. Temperatures three months after the challenge are estimated based on the follow-up survey, while the temperatures during the last week were produced by thermologger data. Therefore, the comparison should be

taken with caution. The participants might feel like they continued to lower indoor temperatures when they stayed at similar temperatures, or they might have accentuated the actual reduction, or they might have been influenced by their representations of the researchers' expectation in writing their answers down. However, as a majority of participants expressed their willing to continue to heat less during the exit interview, it is reasonable to suppose that they actually reduced their indoor temperature.

Table 11. Indoor temperatures before and after the challenge
Source: thermologgers, baseline and follow-up survey, n=35, 35, 23

	Total	ELL1	ELL2
Estimated temperature before the challenge	19,83	20,20	19,42
Temperature during the first week	24,86	24,50	25,22
Temperature during the last week	20,81	21,39	20,55
Temperature loss between the first and last week of the challenge	4,05	3,11	4,67
Estimated temperature after the challenge	19,31	19,34	19,27

Heating less meant finding ways to be comfortable at lower temperatures. During the four weeks of the challenge, participants used known techniques to keep warm, and extended their comfort threshold by getting used to colder temperatures and wearing thick layers. Table 12 explores the persistence of alternative practices used by our participants to stay comfortable. It shows that ELL participants' practices related to thermal comfort were greatly influenced by the challenge. Most measures were taken more frequently three months after the challenge than right after it, which can indicate that they did continue to live at lower temperatures. Wearing extra clothes and putting on a blanket while on the sofa is an exception to this, as both measures were taken by 2% fewer participants three months after the challenge. Otherwise, the proportion of participants who moved around when feeling cold went up by 10% between the last week of the challenge and three months after, going from 7% to 17%. Similarly, while 52% of participants wore socks or slippers to keep warm right after the challenge, 61% of them used socks or slippers three months later. This might have to do with the fact that winter really set in in the months following the challenge (the follow-up survey was filled in March), which could have been an incentive to try these new strategies for keeping warm

Table 12. Persistence of alternative practices of keeping warm
Source: closing and follow-up surveys; n=29, 23

Measure	Number of participants taking these measures after the challenge		% of participants taking these measures after the challenge	
	Right after the challenge (n=29)	**Three months after** (n=23)	**Right after the challenge** (n=29)	**Three months after** (n=23)
Turned down the heating in certain rooms	12	13	41%	57%
Turned down thermostat setting or turned off heaters/radiators when you've been away from home	7	6	24%	26%
Changed the settings on the heating timer so that the heating comes on for	0	3	0%	13%

less time				
Worn extra clothing to stay warm	21	16	72%	70%
Worn socks or slippers to keep warm	15	14	52%	61%
Used a blanket to keep warm when sitting on the sofa etc.	12	9	41%	39%
Used extra blankets to keep warm during the night	8	7	28%	30%
Had warm foods or drinks to keep warm	8	7	28%	30%
Moved around more in order to keep warm	2	4	7%	17%
Spent more time with family/friends in a single room	0	1	0%	4%

Overall, the participants' desired temperatures decreased during the challenge, and stayed lower three months after. Table 13a examines the persistence of potential changes in standards of indoor comfort. For instance, while the comfortable temperature for the living room was estimated at 21°C before the challenge, participant found themselves comfortable at 20°C directly after the challenge and three months later. The desired temperature for adult and children bedrooms stayed more or less the same, slightly over 19°C. When looking at ELL1 and ELL2 households separately, we note that in ELL1, the desired temperatures only decreased in the living room area and in ELL2, the expected temperature for the bedroom actually increased.

Table 13a. ELL participants' perceptions of desirable temperatures in the winter during daytime before and after the challenge, in °C
Source: baseline, closing and follow-up surveys; n=35, 29, 23

	All			**ELL1**			**ELL2**		
	Before (n=35)	**Right after** (n=35)	**Three months after** (n=23)	**Before** (n=19)	**Right after** (n=19)	**Three months after** (n=14)	**Before** (n=16)	**Right after** (n=16)	**Three months after** (n=9)
Living room area	20,81	20,07	19,87	21,14	20,08	19,93	20,44	20,05	19,78
Bedroom	18,71	18,38	18,89	19,00	18,50	19,00	18,41	18,18	18,72
Children's bedroom	19,95	19,54	19,15	20,46	19,81	19,81	19,43	19,10	19,31

Table 13b allows for a more precise description of changes in participants' perception of indoor comfort, and the evolution of their preferences, showing the differences in temperature preferences right after and three months after the challenge. Among both ELL groups, the expected temperature in the living room had decreased by 0,74°C right after the challenge, and from a further 0,2°C, to 0,94°C three months later. The most important reduction happened among ELL1 households, although the desired temperature continued to go down after the challenge in both ELL groups for this area of the home.

Table 13b. Temperatures perception losses compared to before the challenge
Source: baseline, closing and follow-up surveys; n=35, 29, 23

	All		ELL1		ELL2	
	Right after (n=35)	**Three months after** (n=23)	**Right after** (n=19)	**Three months after** (n=14)	**Right after** (n=16)	**Three months after** (n=9)
Living room area	-0,74	-0,94	-1,06	-1,21	-0,39	-0,66
Bedroom	-0,33	0,18	-0,50	0,00	-0,22	0,32
Children's bedroom	-0,41	-0,80	-0,65	-0,65	-0,33	-0,12
Average loss	-0,49	-0,52	-0,74	-0,62	-0,32	-0,15

In the children's bedroom, the expected temperatures slightly decreased in both ELL groups. In ELL2 households, the has been an increase between the end of the challenge and three months later, but stayed lower than at the start of the experiment (going from 0,33°C right after the challenge to -0,12°three months after). In ELL1, the reduction stayed at -0,65°C in both the closing and the follow-up surveys. For the adult's bedroom, the participants were able to reduce their thermal comfort zones during the challenge, but their temperature expectations went back up after three months. In ELL1, the desired temperature stayed stable during the whole challenge. In ELL2, the expected temperature was curiously higher three months after than before the challenge, with an augmentation of 0,32°C. A similar result is found when considering both ELL groups together. The expected temperature first goes down by 0,33°C, but then goes up of 0,18°C after three months. The average diminution in ideal temperatures, which considers all areas of the home in both ELL groups simultaneously, is of -0,49°C right after the challenge, and -0,52°C three months later. This suggests that overall, participants stayed accustomed to the lower temperatures they experienced during the challenge.

4.2 PERSISTENCE OF CHANGES IN PRACTICES OF CLEANLINESS

The challenge seems to have had a lasting effect of laundry practices as well, as shown in Table 14. The number of weekly cycles is significantly smaller right after the challenge and three months later as before the challenge for both ELL1 and ELL2. Indeed, from an average of 3,13 laundry cycles before the challenge among ELL2 households, the number of machines launched weekly dropped to 2,32 a week right after the challenge, to 1,89 three months after. ELL1, participants went from 2,66 cycles a week before the challenge, to 1,68 right after and 1,86 two months later.

Table 14. Average number of laundry cycles before and after the challenge
Source: baseline, weekly, closing and follow-up surveys; n=35, 35, 29, 23

Number of laundry cycles	**Total** (n=35)	**ELL1** (n=19)	**ELL2** (n=16)
Before the challenge	2,87	2,66	3,13
During the challenge	2,17	2,26	1,9
Right after the challenge	1,92	1,68	2,32
Three months after	1,87	1,86	1,89

Table 15 shows which practices persisted that allowed the number of laundry cycles to stay significantly lower after the challenge than it was before. In keeping with what participants said during exit interviews, only a minority used the eco-programme. The practice of washing fuller loads has

also been abandoned by many participants, who, three months after the challenge, seem to favour producing less dirty laundry, over filling the machine more. This is consequent with what they declared in the closing and follow-up surveys, where people indicated they keep examining their clothes carefully to see if they need washing (83% right after the challenge and 74% three months later) and store their lightly used clothes in order to wear them again, which was still done by 83% of participants three months after the challenge. Airing clothes is still practiced by only 39% of participants three months after the challenge, which might have to do with material arrangements – such as ease of access to a balcony, or ability to air clothes indoors near windows.

Table 15. Persistence of alternative practices of keeping clean
Source: closing and follow-up surveys, n=29, 23.

	More than before, n		More than before, %	
	Right after the challenge (n=35)	**Three months after** (n=23)	**Right after the challenge**	**Three months after**
Examined clothes carefully to see if they needed washing	24	17	83%	74%
Stored slightly used clothes in order to reuse them before washing	24	19	83%	83%
Aired clothes to postpone washing them	20	9	69%	39%
Removed stains without washing the entire item	19	12	66%	52%
Washed at colder temperatures	12	11	41%	48%
Washed fuller loads	15	6	52%	26%
Used the eco programme on the washing machine (if there is one)	9	6	31%	26%

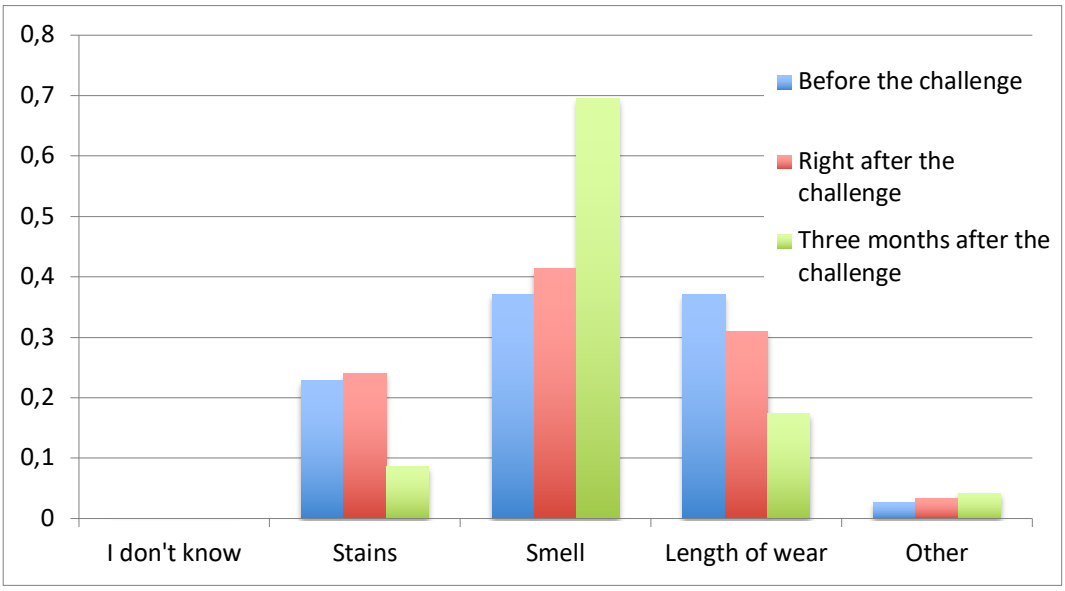
Table 16 and Figure 11 illustrate the persistence of change in criteria for deciding when to wash items. Both clearly show that smell became the most important criteria, carrying significantly more weight than stains or length of wear. This represents an important change in comparison to before the challenge, when stains, smell and length of wear were given equal importance. As the practice of removing stains before washing an item seems to have lost importance over time, it is possible that participants became more tolerant in this regard, although this was not mentioned in exit interviews. We can also observe a steady decline in the length of wear as a criterion, which only plays a marginal role in comparison with smell three months after the challenge.

Table 16. Persistence of changes in criteria for deciding when items require washing
Source: baseline, closing and follow-up surveys, n=35, 29, 23

	Before the challenge (n=35)		Right after the challenge (n=29)		Three months after the challenge (n=23)	
	n	%	N	%	n	%
I don't know	0	0%	0	0%	0	0%
Stains	8	23%	7	24%	2	9%
Smell	13	37%	12	41%	16	70%
Length of wear	13	37%	9	31%	4	17%
Other	1	3%	1	3%	1	4%

While important changes in practices were to be expected between before the challenge and right after, the difference between right after the challenge and three months later is even more important, as Figure 11 clearly shows. For smell and length of wear, it seems that the new practices either quickly stabilised or completely disappeared, leading to a much more contrasted portrait three months after the challenge than right after, in comparison to before the challenge.

Figure 11. Persistence of changes in criteria for deciding when items require washing
Source: baseline, closing and follow-up surveys, n=35, 29, 23



The laundry challenge seems to have induced a lasting transformation in participants' habits and practices. Although we can only hypothesise at this point, the data suggests an important transformation in notions of clean and dirty in relation to clothes, linen and towels, as shown by the growing importance of smell and the diminishing role of the length of wear in deciding when to put an item to wash, which led to an important diminution in the number of laundry cycles per week. In this regard, the laundry challenge seems to have been a success in terms of understanding change, but also in inducing lasting transformations in practices and habits. To use the words of a participant:

> And then you think: "When is it going to be over?". And actually when it is over, you don't change. You continue to not do the washing. Which is very nice as well.

4.3 POTENTIAL EFFECTS: SPILLOVER EFFECTS, REBOUND EFFECTS AND POTENTIAL FOR SCALING UP

Data from the follow-up survey, along with the exit interviews and focus group discussion, allowed to identify potential effects in terms of scaling up, spillover, but also rebound effects. While results are somewhat blurred, they point to several possibilities for scaling up in supporting participants to communicate their experience and contribute to the development of other similar initiatives[8].

For many participants, engaging into the reduction of energy consumption through the laundry and heating challenges led to a critical assessment of other everyday practices, as drawn from the qualitative data. For example, a little girl from an ELL2 family convinced her parents to avoid taking the plane to go on vacation. Eight participants started taking shorter showers to save energy, but also water (Table 18). Many participants said they thought over how they use their dishwasher. The actual positive or negative rebound effects would need to be further assessed, both in relation to direct rebounds (using more or less of the same unit of production); or indirect rebounds (using more or less of another unit of production). Quantifying and qualifying exact rebounds is beyond the scope of this project.

Based on survey data, Table 17 explores potential spillover effects from the ELL through measuring changes in general engagement with energy and climate issues. It is not possible to notice strong spillover effects, with data being somewhat inconsistent. For example, 84% of participants indicated they would consider energy efficiency when buying electrical appliances and devices before the challenge, but only 21% right after the challenge, and 83% three months later. The same pattern repeats itself when it comes to raising energy and climate issues at work or considering energy and climate issues when voting. Similarly, three months after the challenge, only 26% of participants said they actively search for news and information on energy and climate issues, compared to 54% before the challenge. Understanding this decline in the engagement with energy and climate issues as declared by participants would necessitate further research. These data also run against the general trend in exit interviews and focus group discussion, which showed a heightened interest in energy and climate-related issues among participants, a broader reflexion on how they could reduce their consumption in other areas of their daily lives, and a readiness to rethink their everyday habits and routines to see how they could transform them to reduce consumption. It is also possible that participants interpreted the question as asking them if there was a change in their engagement with energy and climate issues following the challenge.

Table 17. Spillover effects from the ELLs: changes in general engagement with energy and climate issues
Source: baseline, closing and follow-up surveys, n= 35, 29, 23

	Before the challenge (n=35)		**Right after the challenge** (n=29)		**Three months after the challenge** (n=23)	
	n	**%**	**n**	**%**	**n**	**%**
Not specifically	0	0%	4	14%	1	4%
Raise energy and climate issues at home or with friends	27	73%	19	66%	16	70%
Raise energy and climate issues at work	15	41%	8	28%	11	48%

[8] We encountered difficulties in calculating the CO2 savings. The data will be provided at a later date

Raise energy and climate issues in NGOs or other groups of which I am a member	12	32%	2	7%	2	9%
Actively search for news or information on energy and climate issues	20	54%	4	14%	6	26%
Consider energy and climate issues when voting	31	84%	10	34%	17	74%
Consider energy efficiency when buying electrical appliances/devices	31	84%	6	21%	19	83%
Other	3	8%	4	14%	4	17%
I buy low-energy light bulbs	--	--	--	--	21	91%
I take shorter showers (5 or 6 minutes)	--	--	--	--	8	35%

Drawing on answers to the follow-up survey, Table 18 indicates limited effects in terms of time and energy saved by participants. 43% of participants noticed no time saving, and 26% less than one hour per week, with no clear idea of what the time saved was used for. 30% responded “don't know” when asked what they used the time saved for. This is similar to the money saved: 48% don't know how much money they saved every week, 30% said between 5 and 20 CHF, and 13% no money saved at all. For those who did say they saved money, 26% indicated the savings were directed towards everyday running costs, and 39% don't know. It is useful to remind here that even though participants didn't see a big difference it terms of time and money saved, many felt relieved from stress from having less laundry to wash, which was also of great value to them.

Table 18. What would money and time savings be used for: most common responses.
Source: follow-up survey, n=23

Amount of time saved	**%**	**Amount of money saved**	**%**
None	43%	None	13%
Less than 1h per week	26%	5-20 CHF	30%
1-2h per week	4%	20-50 CHF	0%
3-4 hours per week	9%	50-100 CHF	4%
More than 4 hours per week	0%	More than 100 CHF	4%
Don't know	17%	I don't know	48%
Time saved used for		**Money saved used for**	
Not applicable, no time saved	48%	Not applicable	30%
Sleeping	4%	Everyday running costs	26%
Reading	4%	Savings	0%
TV/computer	4%	Eating out	0%
Cooking	4%	Purchase of new equipment	0%
Other housework	9%	Entertainment	4%
Home maintenance	0%	Travel	4%
Sports or outdoors	0%	Don't know	**39%**

Cultural activities	0%	Other	0%
Social activities	9%		
Working	4%		
Travel	0%		
Don't know	30%		
Other	4%		

Table 19 presents the how participants shared their experience of the challenge and the potential for dissemination of new practices. Most participants were ready to discuss their experience with people from their private sphere, such as other members of their households (52%), relatives (57%), friends (39%) or neighbours (35%). They were much more hesitant to discuss their laundry and heating habits with co-workers (17%) or on social media (13%). This suggests that working within participants' personal networks might be a good strategy to spread new practices, but this carries the risk of always staying within the same social circles. To avoid this trap, working with employers to change practices at the workplace could offer interesting possibilities.

Table 19. Share of households having shared or willing to share experiences
Source: follow-up survey, n=23

	n	%
Nothing in particular	7	30%
With other members of their households	12	52%
With relatives	13	57%
With friends	9	39%
With neighbours	8	35%
With co-workers	4	17%
With groups/associations	0	0%
At the children's school or sports club	0	0%
On Facebook, Twitter or Instagram	3	13%
With a blog post	1	4%
On a newspaper article	0	0%
Others	4	17%

In general, participants are continuing on with at least some of the new practices they took up, as a direct result of the challenges. A few of them said they would be interested in taking part in similar initiatives. One participant suggested a challenge for reducing waste. While they might shy away from trying to engage others in taking similar steps, it might still be fruitful to encourage participants in sharing their experience and contributing to normalising sufficiency practices, through discourses and actions.

5. FEEDBACK FROM PARTICIPANTS AND IMPLEMENTATION TEAM ON ELL IMPLEMENTATION

Most participants enjoyed taking part in the challenge, looking critically at their everyday practices, and having the opportunity of trying new ways of doing things. Starting to also reflect on other everyday habits, in relation to water consumption for example, was also named as a positive effect of their involvement in the ELL. Some also liked sharing their experience with the research team through the diaries, surveys, interviews and focus groups. They hope their participation will play a part in supporting more sustainable energy consumption practices. One woman says:

> Yes, we think about it more. Yes. Whereas normally, I don't think about it at all, but it becomes a habit. Where as now, it's more… well, I have to look at the temperature, that's it. All these little things that I never used to do.

One participant plans to keep on writing a laundry diary, as she found it very useful to keep track of her habits. Another woman talked about "taking a step in the right direction":

> Yes, well, also to be happy to take a step in the right direction, towards something more… better for the environment.

Some participants didn't like the diaries, especially the heating diary, because they found it stressful and it gave them the impression they were writing down the same information twice (in the diary and in the surveys). One woman would have liked for the challenge to last longer, to have the opportunity to try her new practices over time, instead of just "holding on" until the end of the challenge.

> -Perhaps the only thing that I think is that we're all short on time.
> -Yes
> -So we don't… we don't really… I mean I was left a bit… I'm not sure how to put it… I mean I was wondering about things, with the laundry.
> -Yeah
> -Like how long I would be able to keep it up. Whether I could do that all the time from now on, actually. […] I think that people who manage it for two or three months end up developing more strategies and so on. Because, you know, in a few weeks, I'd say you think, "Ok, I'll just put up with it". But if you were to say, "OK, well, from now on, we have to live like that"… Well in that case I think that we'd really think about adopting a different attitude to… to different everyday tasks.

There were big differences between the feedback from focus groups and the feedback from individual interviews, with more downside discussed during the focus group discussion, for example how the challenges created tensions in some households. For instance, one ELL2 participant doubted changing habits in his household would really have an impact in regards to climate change:

> We wondered, actually, what the point was in feeling uncomfortable at home, in our flat, just to have the temperature at between half and 2 degrees less, because it's actually a real bother for us, so what's that related to, are we really going to save the planet like that? If we do something at our level, to what extent do we have an impact on the planet overall? We're being asked to make an effort, but it feels like industry is not necessarily doing the same, anyway.

Comments from the focus group were still mostly positive, and the overall impression from participants was that they had a very interesting experience, and many of them would be ready to be part of such initiatives again.

6. CONCLUSIONS AND REFLECTION

The ENERGISE Living Labs have led to overall changes in how laundry and heating practices play out in Geneva households, contributed to reduce energy usage, and had positive spillover effects as a result. The social practice approach, which informed the methodology, was highly valuable, in that it served to make explicit the inter-linkages between practices: heating homes, sleeping, or caring

for guests, for example. It also revealed the importance of the different dimensions of practices to understand change: from people's competencies and skills, to routines and habits, to material arrangements, and representations of social norms. The transformation of practices is never the result of solely one change in an element, but rather in how these elements interrelate. Practices were reorganised when, for example, people learned how to keep warm with additional clothing, were able to act on the heating systems, and also challenged their own standards and expectations of thermal comfort. If some participants found it more difficult to change, it was often because they already had or believed they had "sustainable" ways of doing, and could not improve much more.

We propose a set of hypotheses for why changes in social practices might take place:

- A highly organised routine might make it more difficult to change practices, especially when it is supported by social norms and representations people resist challenging or to put in perspective.
- **Making energy visible** through devices such as wattmeters and thermometers, and engaging people in recording energy usage, is a powerful tool for change, as it transforms representations and equip people with new skills to act on their energy consumption. It contributes to giving people agency over material arrangements, thus inducing change in one central dimension of a practice.
- **Giving people permission** to go outside of their comfort zones is a promising approach towards changing everyday practices. With this form of experimentation, trying out new approaches to social norms is permitted, while being bounded in a certain period of time. However, such initiatives must be presented as a social learning process and not a competition.
- **Social relations and everyday interactions** are an important element to account for, as they determine the standards and expectations people will meet over a day or a week, while being home, at work, or at school, for example. This includes relations experienced as a child (in the family or through the education system), as an adult, and in negotiating dynamics between couples, and with children.

There does not seem to be a difference between ELL1 and ELL2 in the Swiss case, perhaps due to a weakness in the design of ELL2, which did not allow for sufficient collaborative opportunities between households. The community of place did not succeed in inciting interactions between people, towards a more collective approach. Engaging people in communities of interest (by allowing ELL1 recruits to exchange for example) could have been a more promising strategy.

Our findings have a number of policy implications: First, there is high potential in forms of experimentation or pilot initiatives which engage people in changing their practices for limited periods of time and at the community level. Rather than relying on better information or more efficient technologies as the main impetus for social change, engaging everyday people in new ways of doing – laundry and heating, in this case – is impactful in terms of reducing energy consumption, but also in terms of potential positive spillover effects. Second, the material arrangements of households seem to have an important hold on how practices play out, particularly in relation to the more static process of heating homes. This has implications for how buildings are designed: we must ensure that people can continue to have an influence on their thermal comfort, rather than counting on smart buildings or invisible heating systems. The influence of making energy visible was an important factor of success. Third, childhood remains an important period for instiling certain habits that are based on principles of sufficiency, such as living with lower temperatures, or washing clothes less frequently.

These policy recommendations must, however, account for the time and resource intensity of organising Living Labs, particularly the deliberative phase which was most appreciated by households. In this respect, we could further understand how such initiatives could be amplified, for

example through the involvement of the media, and how everyday people can also become change makers, towards taking on the initiative of deliberating with others and encouraging further participation in ways of reducing energy usage. One caveat, however, is that such initiatives must find ways to go beyond people who are already interested and engaged in energy issues. Working with people who are part of a community of interest, such as a community centre, school parent association, or a gym, could be one way to transcend class and ecological boundaries.

As for future research directions, we find the Living Lab approach to be quite promising, and one that merits further exploration in various contexts, across different themes, and at varying scales. We would be keen to develop a research agenda focused on how people can be further engaged in social change around energy reductions, that integrates a) notions of wellbeing, towards linking energy services to fundamental human needs, and b) collective and collaborative actions, that serve to make consumption not only about individual household activities, but also community actions and activities, such as planting vegetable gardens, generating local renewable energies, or encouraging slow modes of transport.

Picture 14. A happy ENERGISE family!

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