

The hot water challenge:

A soft intervention for sustainable resource consumption



A collaborative venture between Swiss Life Asset Managers, Livit Ltd and ETH Zurich

Sustainability is firmly anchored at Swiss Life Asset Managers. In view of our ecological ambitions, Swiss Life Asset Managers launched the hot water challenge in cooperation with Livit Ltd and ETH Zurich. The purpose of the challenge was to capture the effect of behavioural economic incentives on the individual energy consumption of our tenants. The results were striking and give us cause for optimism.

Motivation and background to the hot water challenge

The Federal Council has committed to achieving climate neutrality in Switzerland by 2050 through its ratification of the Paris Agreement and the formulation of the Energy Strategy 2050. Emissions are to be halved by 2030 compared to their 1990 level. According to the current, revised CO₂ Act, which was finalised by the Council of States and National Council during the 2020 autumn session, at least 75% of the reductions must be made domestically. (Climate Division, Federal Office for the Environment FOEN, 2019). These goals can obviously not be achieved solely by federal government measures. Industry and the private sector will also have to play their part.

Sustainability and energy efficiency are firmly embedded in the business plan of Swiss Life Asset Managers and Livit. And this applies at all levels – from Group level¹ through asset management² to the real estate asset class³, where the impact is much more direct and tangible than in other investment segments.

Swiss Life Asset Managers not only pursues ecological but also social and governance-related goals (ESG) in its investment business and thus also in its real estate business. Climate change is one of the greatest global challenges of our time. According to the IPCC⁴, real estate is responsible for around a third of global greenhouse gas emissions. However, if there is one goal that stands out, it is the reduction of CO₂ emissions. Nowhere else do we make such an effort to improve our ecological impact.

As Switzerland's largest private real estate investor, Swiss Life Asset Managers wants to assume responsibility.

Within the framework of corresponding sustainable building guidelines and a comprehensive programme for optimisation of energy use in the existing portfolio⁵ (BO/IS programme⁶), Swiss Life Asset Managers takes direct measures to reduce the CO₂ emissions in its portfolio. We also use indirect measures and work towards innovative ways of increasing our impact in cooperation with our stakeholders.

For example, the hot water challenge that Swiss Life Asset Managers carried out in cooperation with Livit Ltd and ETH Zurich.

One person in Switzerland consumes about 50 litres of hot water per day on average. In Switzerland, 61 percent of hot water is heated from fossil fuels. Heating accounts for almost 15% of our household energy consumption (Livit AG Real Estate Management, 2020). In view of these facts, we initiated an investigation into the potential of saving resources by reducing hot water consumption.

As part of this study, data was evaluated from over 4700 households throughout Switzerland and 3800 of these households participated in the hot water challenge. These households were given monthly updates on their hot water consumption during the hot water challenge. In addition, households had the chance to win the prize of a month's rent if they met the target of saving 5% of initial consumption.

¹ see Sustainability Report

² see SLAM Responsible Investment Report

³ directly held real estate investments

⁴ Intergovernmental Panel on Climate Change

⁵ operational upgrades/repairs

⁶ over 140 energy-related operational optimisations, 30 extraordinary energy-related repair work analyses

Turn words into action: methodology and implementation

Implementation of the hot water challenge

The following behavioural economic components were used for the hot water challenge: information about own hot water consumption, a specified saving target, social comparison, hot water savings tips, plus a lottery. Participating households received monthly feedback on their individual hot water consumption. In order to motivate households to achieve the set target of saving 5% of initial hot water consumption, there was a monthly draw for a financial sum equating to one month's rent during the challenge.

The participating households were contacted by e-mail and informed about the background to the investigation of hot water consumption and the participation conditions. Invitees who did not wish to participate were given the possibility of opting out (an opt-out clause was included in the e-mail).

The hot water challenge lasted four months, from the beginning of October 2019 until the end of January 2020⁷. The aim was to reduce hot water consumption by 5% compared to September 2019.

The following hot water saving tips, among others, were made available online:

Shower instead of a bathing:

A bathtub full of warm water uses much more hot water and therefore energy than a shower.

Only warm, instead of hot showers:

Even a difference of 5° Celsius cuts energy consumption by 10%.

Take measures to save water:

Water-saving showerheads can cut hot water consumption by up to 50%.

Take shorter showers:

Showering for just one minute less saves almost a quarter of the energy needed for the warm water.

Avoid running hot water:

Hot water can be saved by not letting hot water run unnecessarily. For example, you can turn off the water when applying soap in the shower.

Realise consumption volume:

Participants were informed about their actual water consumption during the challenge. This information was illustrated in charts for total, monthly hot water consumption and hot water consumption.

Clean with cold water:

Soap and detergent kill 99.9% of bacteria regardless of the water temperature, so you don't need to clean with hot water.

Experimental design

The effects of the hot water challenge were assessed in a randomised control study. The randomised control study is a commonly used method to detect the effects of interventions of various kinds. This method involves persons (households in this instance) being randomly assigned to an experimental group that receives the intervention and a control group for comparison purposes, which is not involved in the intervention. The random allocation ensures the comparability of the two groups.

This makes it possible to measure the impact of the hot water challenge on hot water consumption. Based on the method chosen for the randomised control study, it can be assumed that the experimental and control groups are comparable.

The exercise covered 4775 households spread over 300 Livi properties. The households monitored for the hot water challenge were divided as follows: 3814 households (80%) took part in the challenge, 961 households (20%) were used as the control group⁸. The 3814 households allocated to the challenge were divided into four experimental groups. These four groups differed in terms of lottery type and social comparison, as follows.

Lottery with or without full information:

Common to all four experimental groups was participation in a lottery. If the winning household failed to achieve the 5% reduction, the sum of the rent was

⁷ In the run-up to the hot water challenge, a pilot study comprising around 100 households was launched and completed successfully.

⁸ To observe the isolated effect of the intervention, the first step was to separate buildings into experimental and control groups, i.e. one entire building within one or the other group. This ensured that all households in one building (i.e. neighbours who could exchange information about the intervention) either took part in the intervention or not. That was to prevent any information exchange distorting the observed effect of the intervention.

donated to the "Fertile soil is a natural CO₂ sink" by myclimate (myclimate foundation, 2020) initiative.

With full information:

This is when a household is always notified if they won the draw. That means a household would know if they would have won a month's rent had they achieved the savings target. Avoiding this unwanted outcome may add motivation.

Without full information:

This means that, as with the lottery, only the actual winners of a month's rent are informed. If a household fails to meet the savings target, they don't hear about the outcome of the draw.

Social comparison:

In addition to the two different lottery types, the experimental group was broken down between participating households with a social comparison and those without. The social comparison allowed participating households to show their savings compared to other households of similar size.

With social comparison: Participating households receive additional information on the consumption of comparable dwellings. This enables households to compare their consumption with that of their peers.

Without social comparison: Households only see their own consumption. As a result, they can't perform any peer comparison of their savings.

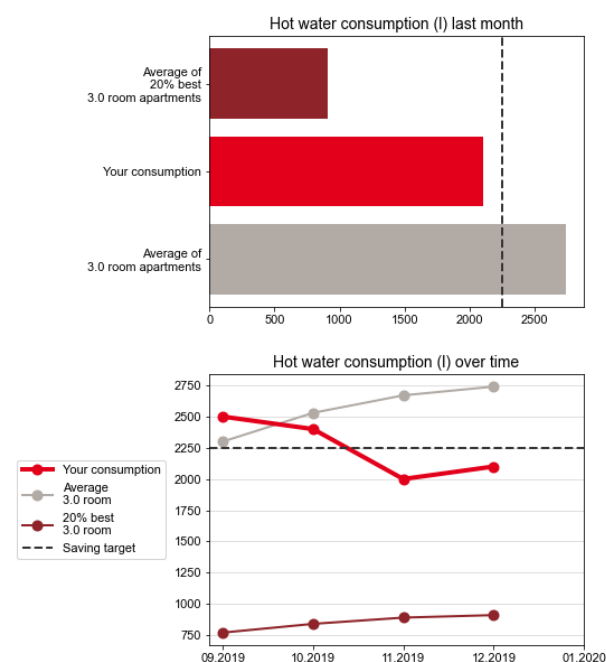


Fig 1: Infographic with social comparison, source: ETH Zurich

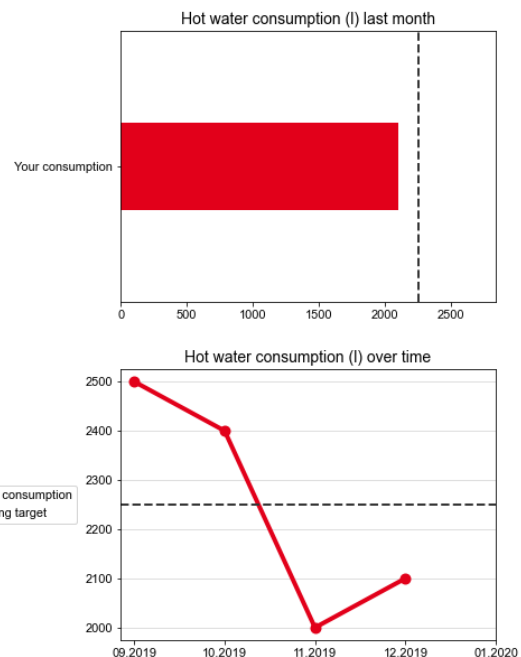


Fig 2: Infographic without social comparison, source: ETH Zurich

Measurement of spillover effect

In addition to the hot water consumption monitoring by the hot water challenge, cold water and heating energy consumption was also measured. These additional variables were observed to identify any further ecological behavioural changes. Before the start of the project, we envisaged three impact scenarios from the behavioural change induced by the hot water challenge on the following variables:

No spillovers:

The change in consumption behaviour of hot water has no significant influence on cold water or heating energy consumption.

Spillovers:

Negation: A reduction in hot water consumption is negated by increased and carefree consumption of cold water and heating energy.

Positive (complementary): The reduction of hot water consumption is complemented by reduced and more careful cold water and heating energy consumption.

Observation of the development of these additional variables made it possible to assess the spillover effect of the hot water challenge on the overall resource consumption of the households in question.

Data protection

Participants were assured that their personal data received the legally required degree of protection. The protection of our tenants' data and the transparency towards our customers regarding the use of this data have top priority. The use of the data in connection with the hot water challenge was deemed legally and ethically sound. This was clarified before the start of the project. All data provided to ETH Zurich was anonymised so that no conclusions could be drawn regarding the personal data of participating households. In addition to the possibility of opting out, which existed at all times, households were informed of their right to object to the processing of personal data.

The incentives make a difference: outcome of the challenge

Effect of the hot water challenge

The data evaluation shows a positive influence by the hot water challenge on participating households' hot water consumption. Despite an absolute increase in hot water consumption due to colder temperatures (winter), a significantly lower increase in hot water consumption (Fig 1) is apparent among the participants (experimental group) compared to the households that did not participate in the challenge (control group).

Even after the end of the challenge, this trend remained and thus confirms a lasting medium-term behavioural change in the experimental group. The effect on hot water consumption was also in evidence during the months following the challenge.

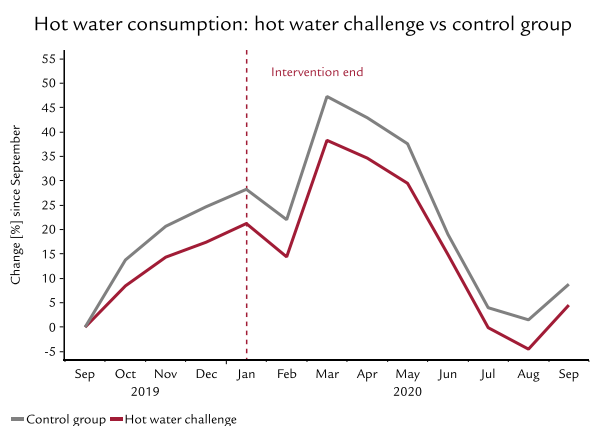


Fig 1: Development of hot water consumption during the challenge

Fig 2a shows the effect during the hot water challenge (October to January). The difference in average hot

water consumption between participating households and the control group is -6.48% and is statistically highly significant ($p < 0.01$). Based on this statistical analysis, this difference can most likely be attributed to the hot water challenge.

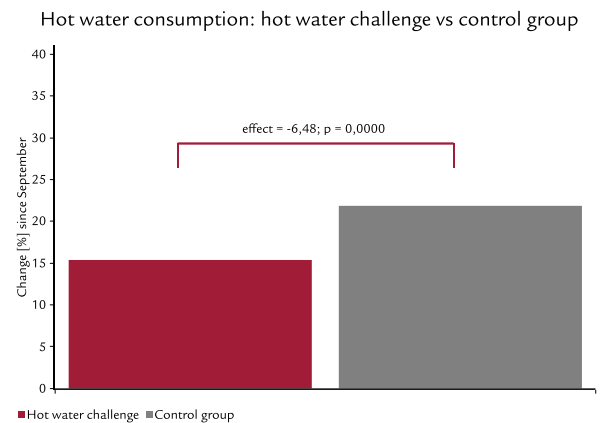


Fig 2a: Difference in hot water consumption: Hot water challenge and control group contemporary

Fig 2b shows the effect after the hot water challenge (February to September 2020). Even after the challenge, hot water consumption by the experimental group was demonstrably lower. This indicates a lasting behavioural change resulting from the hot water challenge. The post-challenge difference is -6.44% and is also statistically significant ($p < 0.01$).

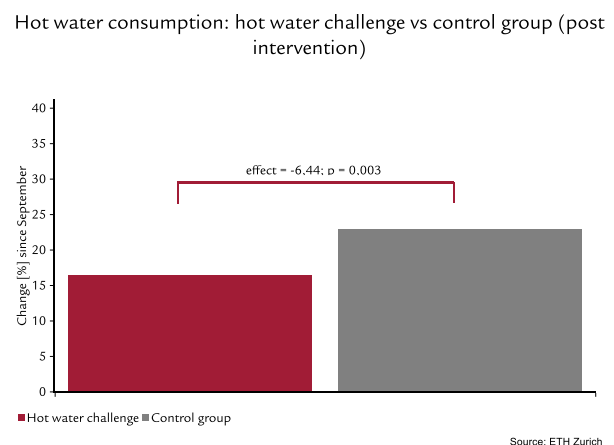


Fig 2b: Difference in hot water consumption: Hot water challenge and control group post intervention

Fig 3 shows the effect of the social comparison. The social comparison works. Thus, consumption in households with a social comparison is 2.84% (statistically significantly) lower than in those without a social comparison.

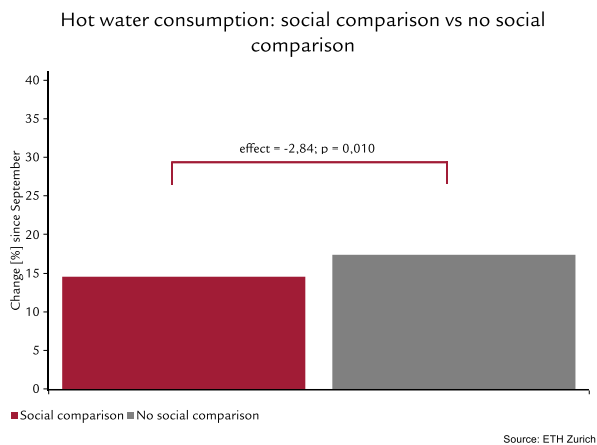


Fig 3: Difference in effect with and without social comparison

Fig. 4 shows the effect of the lottery variants. It's easy to tell that the lottery type had no major influence. The difference is small and not statistically significant.

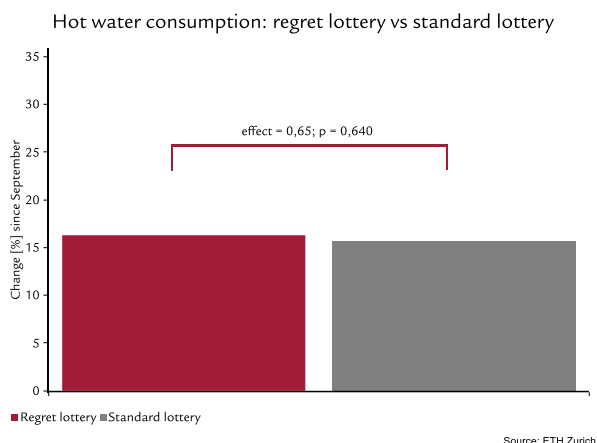


Fig 4: Difference between "regret" and "standard" lottery effect

The observation of additional general energy consumption indicators, i.e. cold water and heating energy consumption, also makes us optimistic about the positive influence of the hot water challenge on energy consumption.

Figures 5a and 5b show the effects on cold water consumption. The observed reduction was insignificant. This would correspond to a positive spillover effect from the hot water challenge. The experimental group shows in this instance a 2.54% reduction in cold water consumption (weakly statistically significant) than the control group during the execution of the challenge. The long-term results after the challenge indicate a behavioural change, but are not statistically significant.

The heating energy results are still being evaluated. The figures will be available in early 2021.

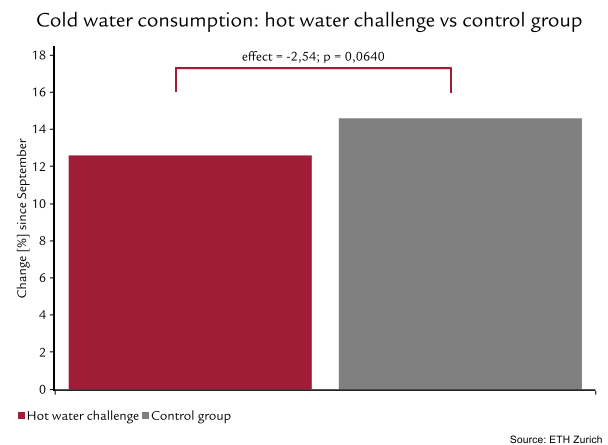


Fig 5a: Difference in effect on additional energy consumption variables (spillovers) contemporary

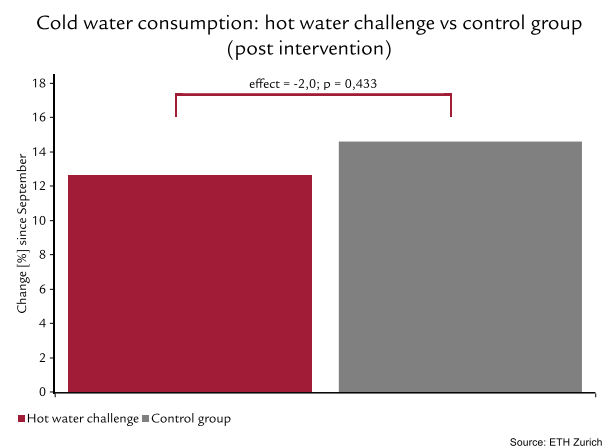


Fig 5b: Difference in effect on additional energy consumption variables (spillovers) post intervention

Summary of the hot water challenge savings

Up to the end of the hot water challenge, the participating households saved a total of more than 2 000 000 litres of hot water, which corresponds to about 39 tonnes of CO₂. These 39 tonnes of CO₂ correspond to 292 000 kWh of energy and cover the average electricity consumption of 39 five-room houses equipped with electric stove, electric boiler and tumble dryer (Swiss Climate AG, 2016). In addition to the ecological benefit, the amount of money saved through the hot water challenge is also striking.

Feedback from participating households

The hot water challenge was not only a complete success in factual terms but also received many positive comments from the participating households. Fig. 6 shows that the hot water challenge was viewed positively by a clear majority of people.

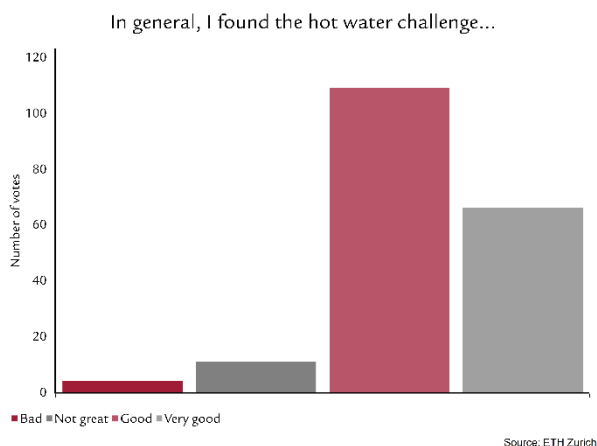


Fig 6: Satisfaction with the hot water challenge according to 192 respondents

The participants' satisfaction with the hot water challenge was reflected in the potential to continue the challenge. Fig. 7 shows that a majority would like to continue the hot water challenge, even without a draw for a month's rent. Of those households that do not wish to continue without a draw, the majority would wish to continue if the monthly draw remained. The satisfaction and potential to continue give cause for optimism about the impact of the project.

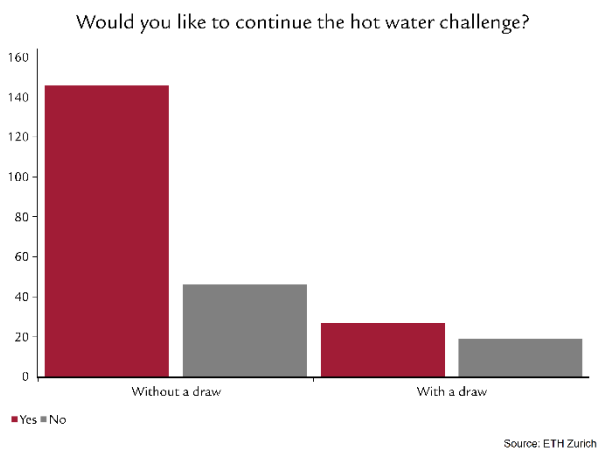


Fig 7: Potential to continue the hot water challenge according to 192 respondents

Conclusion

As mentioned above, the energy saving potential in Switzerland is significant. Savings in private energy consumption can make a fundamental contribution to achieving the federal government's goals of net zero emissions by 2050. Based on these facts, Swiss Life Asset Managers, Livit Ltd and ETH Zurich undertook a project to reduce hot water consumption: this "hot water challenge" ran from the beginning of October 2019 until the end of January 2020.

The data analysis shows that the hot water challenge was effective during and after the intervention. The hot water challenge had a positive effect and significantly reduced the consumption of hot and cold water compared to the control group. The findings to be drawn from the study about the potential for personal energy savings are invaluable. In addition to the significant savings achieved, we are optimistic about the satisfaction and enthusiasm of the participating households in finding a good way to reduce private energy consumption.

Based on the significant consequences of the prize-incentive for hot water consumption by the households examined as well as the positive feedback on the implementation of the challenge, Swiss Life Asset Managers and Livit Ltd, in cooperation with ETH Zurich, would like to build on the successes achieved thus far. Extending the hot water challenge to a wider range of households could lead to significant savings in resources and emissions in the long term.

The goal of achieving climate neutrality for Switzerland by 2050 is paramount and requires proactivity beyond the capacity of the federal government.

Swiss Life Asset Managers has been investing in real estate for over 125 years and is the owner of the largest privately held real estate portfolio in Switzerland. We implement effective sustainability activities right across the real estate lifecycle. Climate criteria are taken into account in the purchasing process and the portfolio is systematically energy-optimised. We also raise tenants' awareness of the efficient use of resources and focus on social aspects such as accessibility and comfort or general tenant satisfaction.

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Alongside Economic Research and the ETH, many other hands and heads at Swiss Life Asset Managers Real Estate Switzerland and Livit, as well as other partners and colleagues, contributed to the successful implementation of the project. We would like to thank each and every individual for supporting the hot water challenge!

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