

# ***THE RELEVANCE OF SOCIAL REFERENCE POINTS FOR ENERGY SAVING BEHAVIOR: EVIDENCE FROM A FIELD EXPERIMENT IN SINGAPORE***

Prof. Dr. Renate Schubert, ETH Zurich & FRS/SEC Singapore, +41 44 632 47 17, schubert@econ.gess.ethz.ch  
Dr. Jan Schmitz, ETH Zurich, +41 44 632 41 83, schmitz@econ.gess.ethz.ch  
Zhengyi Jiang, FRS/SEC Singapore, +65 8587 8621, zhengyi.jiang@frs.ethz.ch

## **Overview**

Singapore, like many other countries in the present world, strives for promoting energy efficiency and reducing greenhouse gas emission. One important direction in meeting these goals is to curb households' electricity demand, since households are one of the major consumption groups and electricity in Singapore is mostly produced from fossil fuels. In Singapore, a considerable share of households' electricity consumption goes to air-conditioning facilities which cool houses and apartments. Hence, encouraging energy-efficient behavior in air-conditioning use contributes to an increase of the overall energy efficiency. It is worthwhile to look into the issue of motivating private households to reduce the usage of air-conditioning appliances and to use them efficiently. Our study focuses on this question, assuming that households' choice of appliances is external to our study.

Monetary as well as non-monetary incentives could be used to reduce private households' air-conditioning usage. Our study investigates into the role of non-monetary incentives. Behavior outcomes of others could be an important factor influencing individuals' energy-related behavior. Hereby, our study focuses on a decision maker's "relevant others" in social life, such as friends, family, neighbors, colleagues, etc., whose outcomes are considered as reference points to a decision maker. It is known from literature that "relevant others" especially those in close relationships may impact individual environmental behavior (Cialdini et al., 1990). Our study is to find out whether and in which way private households' electricity consumption on air-conditioning depends on information about other households' air-conditioning consumption.

The hypotheses tested in our study are the following:

- Hypothesis H1: Normative information about air-conditioning usage of relevant others has an impact on individuals' air-conditioning usage
- Hypothesis H2: Air-conditioning usage reduction reacts stronger to information about more comparable or more similar social reference groups than to information about others in general

On the one hand, information about low consumption of other households could motivate individual households to save energy more pertinently than before; on the other hand, however, there could be undesirable "Boomerang Effect", meaning that households may increase consumption after observing others' higher consumption levels. This effect could be neutralized by normative information (Schultz et al., 2007). Yet, it is unknown whether this also holds for feedback on comparing with specific other households and not an average consumption. The impact of others' behavior outcomes as social reference points varies across different types of closeness (Goldstein et al., 2008). Outcomes of more relevant social reference groups are expected to produce higher impacts. Our study compares the effectiveness across different types of social reference groups.

Since SingaporePower electricity bills contain information on the average Singaporean electricity consumption, it seems important to find out more about the impacts of this information. If it would turn out for example, that individuals' electricity consumption is more susceptible to information about the respective consumption of relevant others than of a country's average consumption, it might be adequate to re-shape the phrasing of comparisons on the electricity bills. In that sense, information about close reference points would be more effective to achieve reductions in individual electricity consumption than information about more distant reference points.

## **Methods**

To test our hypotheses we conducted a field study with around 400 students living in four-room apartments in the NUS UTown Residence. Information about other households' consumption can be given to individual households as feedback to change their behavior. So we sent them weekly email feedback which contains information about their own air-conditioning usage during the last week(s) as well as on the usage of a specific group of others. The study has a between-subjects design with the participating students randomly assigned to the four treatment conditions:

- "Control" treatment: No information on others' air-conditioning usage.

- “Average” treatment: Give each person information about the building’s average level of air-conditioning usage, indicated in the amount of KWh and the respective amounts of monetary cost and CO<sub>2</sub> emission.
- “Same” treatment: Give each person information about the ranking of air-conditioning usage by the four people living in the same apartment. The information was given in the amount of KWh and the respective amounts of monetary cost and CO<sub>2</sub> emission.
- “Other” treatment: As in the “Same” treatment, but replace the other three persons in a participant’s apartment with three persons from a different apartment.

The feedback was given during the fall semester 2016. Whether in a same apartment or not served as a proxy for comparability of social reference groups. The information about the air-conditioning usage was complemented by normative assessments like “GREAT”, “GOOD”, etc. in order to prevent “Boomerang Effects”.

## Results

There were no significant differences between the groups throughout the baseline. After the first feedback on Oct 1, 2016, air-conditioning usage of all treatment groups decreased, and the “Same” group displayed the lowest usage. Starting from the third feedback, the gaps between the control group and the treatment groups had been more obvious. For all but for the control treatment conditions individuals’ air-conditioning usage decreased over time (so that there seems to be no reason to reject H1). The air-conditioning usage of the “Same” group decreased by the largest percentage, and the reduction is statistically significant (10% significance level). The “Average” and “Other” groups had also seen reductions but they are less strong than in the “Same” group (so that there seems to be no reason to reject H2). No “boomerang effect” was found and, on the contrary, people with low consumption used even less air-conditioning in reaction to the information we provided.

## Conclusions

Our results seem to indicate that information about comparable social reference points seems to be effective to achieve reductions in individual households’ electricity consumption for air-conditioning. Based on the results up to now, it seems advisable to think about reshaping the existing format of the electricity bills by changing indications about other people’s energy consumption from information about average consumption to information about relevant others like neighbors, friends, or family. However, it should be noticed that all treatment groups except for the control group do not seem to strongly differ to each other. In order to make the results more convincing, the study should be replicated for a representative sample of Singaporean population.

## References

- Allcott, H., 2011. Social norms and energy conservation. *Journal of Public Economics*, 95(9), pp.1082-1095.
- Allcott, H. and Rogers, T., 2014. The short-run and long-run effects of behavioral interventions: Experimental evidence from energy conservation. *The American Economic Review*, 104(10), pp.3003-3037.
- Cialdini, R.B., Reno, R.R. and Kallgren, C.A., 1990. A focus theory of normative conduct: recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, 58(6), p.1015.
- Fischer, C., 2008. Feedback on household electricity consumption: a tool for saving energy? *Energy efficiency*, 1(1), pp.79-104.
- Goldstein, N.J., Cialdini, R.B. and Griskevicius, V., 2008. A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of consumer Research*, 35(3), pp.472-482.
- Schultz, P.W., Nolan, J.M., Cialdini, R.B., Goldstein, N.J. and Griskevicius, V., 2007. The constructive, destructive, and reconstructive power of social norms. *Psychological science*, 18(5), pp.429-434.