

The Home Energy Study – quantitative analysis

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The first of the three CHARM case studies, the *Home Energy Study*, set out to explore the effects of providing householders with feedback on the amount of electricity they were consuming. The study used a quasi-randomised controlled experimental design to test the impacts of two types of feedback over a period of 18 weeks: feedback on a household's own consumption and feedback that also included average figures for others in the neighbourhood. The project monitored how much electricity participants used and recorded how often they looked at the feedback provided. In addition, participants completed pre- and post-study surveys and a number of householders were interviewed.

This short paper gives a summary of the research and the research findings. For more details, see our forthcoming paper in the *European Journal of Marketing*, *Is social norms marketing effective? A case study in domestic electricity consumption* and for more in-depth discussion of our qualitative analysis of the interview data, see the accompanying paper, *The Home Energy Study – qualitative analysis*.

Research in the US had suggested that telling people about the average electricity use of others could lead to reductions in consumption of between 2% and 8%.^{1,2,3} However, a number of meta-reviews^{4,5} cast doubt on the value of social comparisons, so we aimed to compare this form of feedback with feedback that focused on individual consumption. We also questioned whether the findings of the US studies were specific to the North American context and whether the effects of social norms feedback would be the same in the UK.

We therefore designed a quasi-randomised controlled trial that compared three experimental conditions: 1) the receipt of feedback that included only data about an individual household's consumption; 2) the receipt of feedback that also included a neighbourhood average, and 3) a control condition without feedback.

Fieldwork was based in Bristol, UK. Over 400 households were professionally recruited, door-to-door, from one poorer and one richer area of the city, using an £80 incentive. Three hundred and sixteen households (79% of those recruited) successfully completed the 18-week study and the pre- and post-study questionnaires. We had developed and built monitoring devices capable of

¹ Allcott, H. (2011), 'Social norms and energy conservation', *Journal of Public Economics* 95 (9-10) 1082-95.

² Ayres, I., Raseman, S. & Shih, A. (2009), 'Evidence from two large field-experiments that peer comparison feedback can reduce residential energy usage', Annual Conference on Empirical Legal Studies, Yale University, New Haven.

³ Nolan, J., Schultz, P., Cialdini, R., Goldstein, N. & Griskevicius, V. (2008) 'Normative social influence is underdetected', *Personality and Social Psychology Bulletin* 34 (7) 913-923.

⁴ Darby, S. (2006) 'The effectiveness of feedback on energy consumption. A review for DEFRA of the literature on metering, billing and direct displays'. Environmental Change Institute, University of Oxford.

⁵ Fischer, C. (2008), 'Feedback on household electricity consumption: a tool for saving energy?' *Energy Efficiency* 1, 79-104.

measuring consumption changes of 1 Watt or more without the need for manual data entry. These devices sent data to the study server via a mobile telephony service. After a two-week baseline period without feedback, those in the two intervention conditions were sent weekly emails, each of which contained a tip on how to save electricity, a graph showing their consumption and an invitation to access similar graphs on specially-provided, password-protected web pages. Figures 1 and 2 show examples of these graphs.

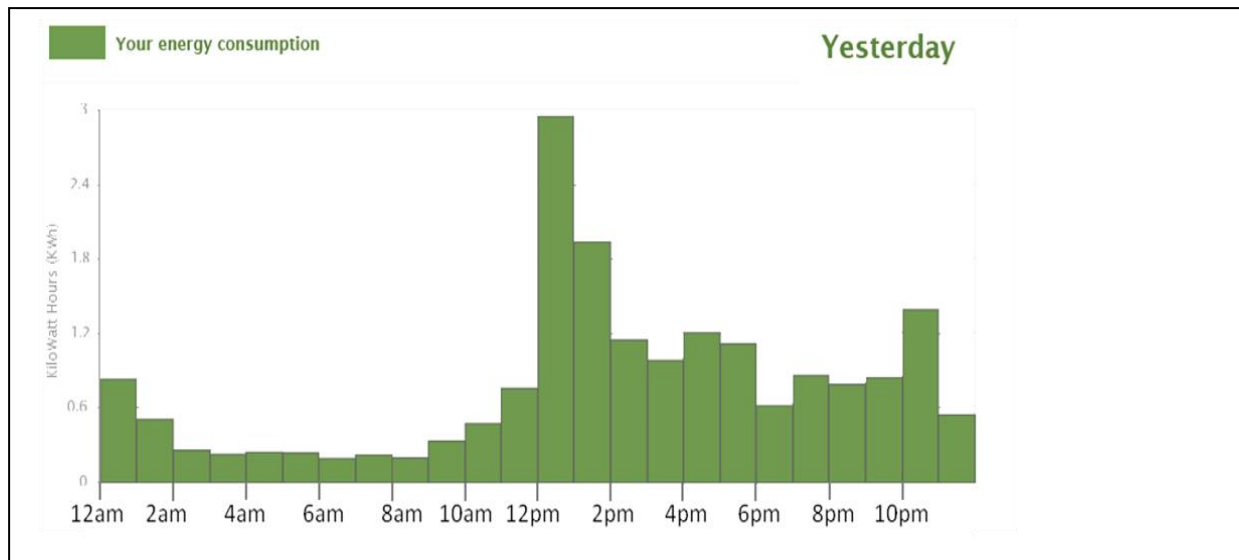


Figure 1: An example of a graph made available to participants in the individual feedback condition

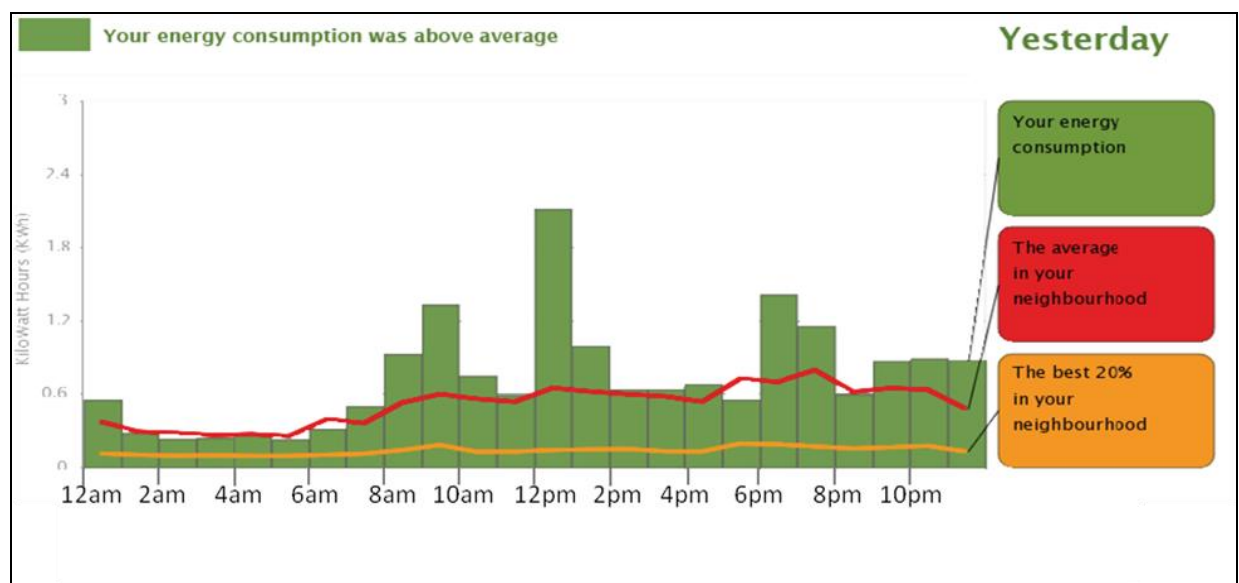


Figure 2: An example of a graph made available to participants in the social norms feedback condition

The study was conducted at a time when increasingly long days and warmer weather were causing a reduction in electricity consumption for all the participants. However, linear regression analysis showed that average consumption levels reduced by 3% more for those who received feedback than for those who did not. The sample was not large enough to test the statistical significance of this unexpectedly small effect, but comments by participants in the interviews suggest that the feedback did lead to changes in energy-consuming behaviours. For example, some participants reduced their

use of tumble driers; some purchased low-energy white goods, and some reduced their use of standby. The interviews suggest that the main reason the feedback had this effect was that the graphs provided householders with benchmarks against which to compare their usage – i.e. their own consumption at other times or the consumption of other people. This made it easier for users to see when their usage was higher than usual; to relate this usage to particular practices; to see this usage as potentially wasteful, and to make changes to their behaviour.

Contrary to expectations, regression analysis showed no evidence that those receiving the social feedback reduced their consumption by more than those only receiving the individual feedback. One explanation for this might be that while the social norms feedback encouraged some participants to consume less, it also prompted some of those below the norm to consume more (see Schultz *et al*, 2007, on the 'boomerang effect'). However, there is no evidence of this in the qualitative interviews. A second possible explanation lies in the distinction between overall energy consumption and energy-related behaviours. Much previous research into the social norms approach measured behaviours, whereas in this study the object of measurement was total electricity consumption, which is an outcome of many different energy consuming behaviours. Had we provided social norms feedback on particular behaviours (for example, how often people used tumble driers), this might have had some impact on behaviour.

Although those in the social norms condition did not, on average, change their consumption any more than those who only received individual feedback, they did download the emailed graphs significantly more often. This indicates that the social norms feedback may have been more engaging than the individual feedback and suggests that there may yet be advantages to using the two forms of feedback in combination.

The research provides some support for the role of feedback in reducing electricity consumption but questions the need to complement feedback on individual usage with social norms feedback. Furthermore, it suggests that in order to facilitate the identification of particular behaviours that are 'wasteful', feedback should be shown at a level of disaggregation that allows users to relate it to their own practices – for instance, in hourly or half-hourly time periods. More research into this area is clearly needed. Researchers should consider providing feedback on particular behaviours or practices rather than on the more abstract level of overall electricity consumption. Furthermore, our study demonstrates the importance of including an individual feedback condition in any evaluation of social norms feedback.

Please cite as:

Harries, T., Rettie, R. and Studley, M. (2013) CHARM Research Summary 1: The Home Energy Study: quantitative analysis. Behaviour and Practice Research Group, Kingston University. Available at <http://www.projectcharm.info/>