

## Rebound behaviours, nudges, competition: energy saving is a matter of mindset



**Lowering consumption is not as simple as introducing a new gadget. Besides implementing innovative technologies, it is necessary to stimulate an end-user behavioural change. And cognitive sciences can support energy conservation attitudes**

Understanding how people decide to use less energy at home or at work is crucial to boost virtuous behaviours. Our reaction to any novelty is so complex that a lot of **socio-psychological research** has been done to try to make it more predictable.

Social norms and influences, the ways we become accustomed to an external stimulus and manage our natural competitive instinct (both towards ourselves and the others) are among the factors to be analysed to characterise and support energy-saving habits.

### **Facing the rebound effect**

Psychological studies point out the risk of the so-called rebound effect, a sort of recoil leading us not to use the full potential of an innovation. In other words, **people use more energy because they can afford it.**

[Kirsten Gram-Hanssen](#), professor at Aalborg University, Department of the Built Environment, Copenhagen, explains: “Generally speaking, **20%** of the possible savings in household heating is

**not achieved because of the rebound effect**". People turn the efficiency gained through renovation of buildings and smart devices into increased consumption and higher comfort. Therefore, the change of the user's habits should be studied.

Gram-Hanssen says: "From a policy perspective we have looked too much to technology and behaviour as two different aspects, but they are related. Nowadays, we have a lot of tech that actually makes it easy for us to consume more. If it is convenient and comfortable to use energy, we will not lower our consumption."

"Sometimes we have the idea that lifestyle is something constant and we can improve our savings only with technology. It's not true: lifestyle changes precisely because technology evolves. Think about today's power consumption compared with that of the Eighties: we use much more energy."

It is therefore essential to implement **good communication strategies** to affect end-user behaviour. And it is not so easy, Gram-Hanssen points out: "In our everyday life we don't really care about energy consumption. We don't think about the use of energy but about its purpose: heating, cooking food, communicating, watching television. Moreover, people often have smart measuring devices, but they don't understand them."

According to Gram-Hanssen, relying only on the informative part (for example with providing a home energy report about the energy consumption) "we can expect to have some reduction, but only by a few percent."

### **Making energy 'visible'**

[Richard Bull](#), deputy dean of the School of Architecture, Design and the Built Environment, Nottingham Trent University, comments: "One possible solution is making the energy consumption 'visible', enabling people to start seeing on a screen the real and actual impact of turning off lights, correctly managing cooling systems and so on. Keeping an eye on how much the energy costs and on our environmental impact is really important."

Moreover, **engagement strategies** can be useful. Bull mentions the solutions tested under the EU project [eTEACHER](#), which is studying ICT tools to encourage building users to be more energy efficient. "We have investigated how smartphone applications can connect people and encourage them not to overlook energy," he explains.

"After a long series of workshops to understand what motivates users and to find out opportune recommendations, we developed an app that, for example, exploits **people's natural competitive approach through gamification**. This envisages social interaction and rewards. The scientific literature offers many examples of effective energy savings obtained through such ICT tools, typically of [5% to 10%](#) from different contexts and building types."

The starting point of any incentive strategy is the collection of accurate data. “Our app informs the user if the weather is going to change, and has **complex algorithms** (called ‘[what-if analysis](#)’) which make predictions using data about temperature and other physical parameters collected by sensors installed in windows and blinds,” explains Bull. “Will it be particularly hot or cold, in the next hours? Are we going to face meteorological variations? Based on these forecasts, the software is able to give early suggestions - for example - on how to manage the heating system. The app has been finalised and launched in six demonstration sites in Europe. By the end of 2020 we will have the quantitative results available.”

All of this wouldn't stimulate people without effective **visualisation features**. The keyword has been simplicity, explains Bull. Developing the graphical interface is even trickier than the technical development itself, since design and social science about behaviour must be taken into account. He says: “The information alone is not enough to motivate the user. Everyone is different, but most people don't care about numerical values. Typically, the energy dashboards are designed by engineers who are excited about having all the numerical data and presenting lots of charts. That is extremely useful behind the scenes, but the average user does not want that level of complexity and prefers simplified indicators like **smiley faces, ‘traffic light’ systems and intuitive performance emojis.**”

In the future, we may even imagine something different from an app to monitor energy consumption, like a smart speaker or a smartwatch. “The new generation of home devices (e.g. Alexa or Google Home) are very interesting and increasingly popular. Often people install them for the novelty value, but they can offer energy-saving opportunities. The challenge is that they can't use more energy than what they save, which would obviously be counterproductive.”

## **The ruler of incentives: nudging**

Economic theories have revealed the importance of [nudging](#) or gentle pushing, showing that soft and indirect suggestions can influence behaviour as effectively as laws, commands or forced compliance. This approach has also been applied to the energy field.

The Milan-based Centre for Research in Experimental and Applied Epistemology ([CRESA](#)) led by Professor Matteo Motterlini from the [Vita-Salute San Raffaele University](#), has carried out several studies on this. One of them tested nudge theory in hospitals, offices and universities, **inducing responsible energy use through specific visual stimuli**. An interdisciplinary team of researchers designed a communication campaign using a little leaf-shaped mascot called [EcoRaf](#) and implemented several interventions.

They placed stickers near the light switches showing EcoRaf saying “switch off because the others do so”, to remind people to turn off lights, computers and other equipment when they don't need them, and to boost social competition. Where the switch was not easily visible, some adhesive ‘leaves’ were stuck on the floor to create footprints leading up to it. The aim of the sticker, about 15 cm wide, was to implement a ‘**social descriptive norm**’ (doing what others do) and trigger what in psychology is known as ‘**perceptual salience**’ in object discrimination (when individuals tend to focus on items or information that are more prominent).

They also sent a weekly email informing the community about the energy consumption trend in each department. The researchers want to use social mechanisms such as ‘**comparative feedback**’ and ‘**injunctive norm**’ (doing what others think one should do), with emoticons showing EcoRaf smiling if the results were good or looking sad if they were bad.

“Making the switches visible was enough to give the gentle nudge,” Motterlini comments. “In administrative departments the savings reached about 25% during lunch breaks and weekends, thanks to widely accepted social norms and even a bit of competition between the different floors of the buildings.”

Another [study](#), titled PV EAST, which stands for Photovoltaic (plants) Easy (language) Attractive (message) Social (comparison) Timely (encouraging people when they are more reactive), analysed the behaviour of the owners of 477 domestic photovoltaic systems (power between 3 and 20 kW) in Northern Italy that didn’t perform very well. 318 plants got nudges through [targeted communication](#) aimed at making people aware of the low performance of their plants and encouraging them to carry out maintenance for better efficiency. The messages were about similar plants producing more (**social comparison nudge**) and the loss of money due to poor efficiency (**loss aversion nudge**).

Motterlini says: “We conducted this research with the Italian public company [GSE](#). We knew that solar panels after two or three years produce much less than they should, because for example a tree has grown next to them. As a nudge to reach the owners, we used a hand-signed letter with a simple claim: ‘Most people with solar panels do better than you’. The results were amazing, with a 45% engagement of people who entered our project’s website looking for information.”e

“This is a reason why the communication must be designed by experts who know the levers and mental traps behind users’ decisions very well. I often say that the goal is to achieve an ecological communication for the human mind, based on cognitive ergonomics, personalisation and an a priori plan to balance the unavoidable drop of enthusiasm with additional gentle pushes.” This is because, in the long run, **nudges can create addiction and stop working**, just like antibiotics. Therefore, they should always be studied with the thoroughness of a scientific experiment and reviewed by control groups.

In this context, CRESA, together with the [Customer Behaviour Lab](#) (supported by the energy company E.ON), is working on a EU project called [PEriTiA](#), which will investigate how emotions affect the public's level of trust in scientific institutions and experts regarding global warming. Relying on cognitive sciences, the researchers will study effective ways of communicating the results of climate sciences, in order to promote sustainable behaviour.

By Gianluca Dotti