

Sustainability and coherence of actions aimed at behavioral change in energy consumption

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Our research focuses on changes in energy practices and, more generally, on the changes in lifestyles expected as part of the ecological and energy transitions, by questioning the conditions for their sustainability. Based on an experiment carried out in 2013-2014 on a French territory and on new experiments on a territorial scale, we propose to explore two problematic axes. The first axis concerns the temporalities of change. We questioned the maintenance in time of the changes and adjustments observed three years earlier in volunteer households to test various forms of support and information regarding energy consumption. We were also interested in the possible delayed effects in the medium and long term not observed during the surveys conducted in 2013-2014. The second axis concerns the evaluation of the data we sent in these voluntary households and on a new sample.

The research is multidisciplinary, involving psychology, sociology and engineering sciences, and closely associates the territory, which took part in the construction of the devices, deployed in the experimental phase and in their evaluation. The approach combines a qualitative methodology through in-depth interviews and ethnographic observations with a psychological questionnaire approach.

The research followed different phases:

- Recruitment of households in April 2018
- Household instrumentation in May 2018
- Interviews and questionnaires of instrumented households in June 2018
- Sending of booklets in December 2018, March 2019, June 2019 and September 2020
- Interviews and questionnaires of all households (with control) late 2019-early 2020

The research consists of three separate samples:

- A first sample, which we call the "expert households", which includes households that participated in the previous experiment in 2013/2014 on the territory we studied.
- A second sample, which we call the "novice households", which includes households who did not participate in the previous experiment. We recruited them in several communes of the territory we studied.
- A third sample, which we call the "control" sample, which we recruited at the end of the research and with whom we did not interact during the research.

The "expert households" and "novice households" samples were instrumented and received information about their energy consumption through four booklets received by mail.

The instrumentation was deployed in 49 homes in 8 communes. This represents 208 probes in total generating approximately 30,000 data per day. As the instrumentation was operational for 1.5 years,

we collected more than 16 million data. The electrical meters of all households were instrumented. For some, only specific electricity was measured because heating and domestic hot water (DHW) are produced from other energy sources. For others, the total electrical energy consumption of the household is measured, including heating and DHW (100% electric households). All gas-fired fireplaces were instrumented, except for one fireplace that produces its DHW using gas in a tank.

We proposed to the participating and instrumented households to receive their electricity and gas consumption in the form of a booklet. We sent four, one per season, in December 2018 (based on November 2018 data), March 2019 (based on February 2019 data), June 2019 (based on May 2019 data), and September 2019 (based on August 2019 data). We therefore selected one month per season that we considered representative of the season.

The proposed data were consolidated data and we presented them in a variety of formats. The four booklets proposed a progression in the data presentation. In general, several elements of reflection determined the choices made to create the content of these booklets. We had decided not to vary the content of the booklets too much, but still to leave us the possibility of adjusting elements that would appear problematic during the intermediate interviews.

The individual houses of the project are grouped together within a radius of about 10 km and have an average surface area of about 125m². Although a majority of them is less than 20 years old, these houses were built between 1920 and 2013, which potentially implies a strong disparity in terms of building performance. The vast majority of households are made up of 2 to 4 people. The two energy sources mainly used for heating and DHW are electricity and gas.

A global analysis of energy and comfort has enabled a better characterization of the homes and highlighted certain important elements that shed light on the cross-referencing of the analyses with the other disciplines. It made it possible to determine the main factors influencing energy consumption and comfort, such as the intrinsic characteristics of the houses, the weather or the energy mix of the dwelling for example. The seasonal nature of consumption and comfort was quantified. On the other hand, in order to properly qualify the households based solely on their electricity consumption (the project's starting point), it was necessary to clearly distinguish the energy mix of the households and to know the energy sources of the two most consuming items, i.e. heating and DHW.

Regarding the availability of consumption data, and first of all, apart from any consideration of formatting, we observe that the data are only useful under certain conditions: a favorable reception context, an energy culture, even minimal (awareness), a source identified as relevant, competent, impartial and legitimate, and "accessible" data. Indeed, without a favorable context, no matter how we present the data, it does not reach its target. More seriously, they risk diverting information over the long term by inducing a sense of powerlessness and/or failure. In general, we observe an awareness of energy issues and curiosity that motivate the consultation of data, with the main objective of responding to a normative injunction of energy sobriety.

It is therefore important to:

- Propose information related to the hypothesis of progressive learning
- Limit barriers to reading and appropriation of data

- Capturing attention and contributing to a reflective stance
- Accompany the reading without imposing a normative framework for data analysis (favor contextual reading)
- Facilitate autonomy in reading and analyzing data and decision-making autonomy by contributing to an energy culture