How can we support building users towards more energy-efficient practices?

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ABSTRACT.

Inhabitants play a crucial role in consuming electricity, gas, and water in their homes or workplaces. Recently, there has been a rise in attention and interest in preserving resources and reducing environmental impacts, such as carbon footprint and pollution. Therefore, the "LearningHome" ANR project aims to involve residential inhabitants in energy management activities within their living spaces and support them in enhancing their sobriety while maintaining the desired level of comfort.

A practice is defined as a routinized behavior and activity carried by an individual or a group, such as a family, with a specific purpose to meet their lifestyle needs, including food, comfort, education, health, *etc*. In consequence, identifying changes in energy-consuming practices requires a combination of data analysis, statistical methods, and domain knowledge. Empirical studies have explored the relationships between factors influencing daily routines, while others have investigated the effectiveness of intervention strategies to promote new energy-saving behaviors. However, there is a lack of studies investigating the quantitative changes in the psychological factors influencing energy-related behaviors and practices. Moreover, it is interesting to evaluate and compare the energy-saving intervention objectively, providing more discussions between researchers as well as residential occupants.

My perspectives on the "LearningHome" ANR project are to detect any change in energy-consuming practices of residential occupants and to compare the effectiveness of energy-saving interventions, which will be developed based on the contextualized situation. The information about practice, including resource consumption, usage trends, as well as the driving factors in occupant psychology, will be collected and analyzed statistically. Any observed changes, followed by a qualitative justification, can lead to conclusions about changes in the practices of occupants living in that household. Additional evaluation indicators besides resource consumption and financial expense are required for comparing the interventions. The general methodology is expected to be applied in available living laboratories and real-life households.

At this stage of the project, within an experiment site located in Bordeaux, France, a proposed methodology will be evaluated for the practices of dishwashing and laundering. The collected characteristics will undergo a statistical analysis, primarily through a paired statistical test like the Wilcoxon signed-rank test. This method will help to determine if there is a significant difference in the quantitative data. After deploying one or more energy-conserving interventions, the number of usage cycles as well as the usage period are expected to be reduced and shifted.

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