

## **Understanding the needs and requests of collective heating housing residents to better manage their heating consumption**

Enzo Cabezas-Rivière<sup>1</sup>, Thomas Recht<sup>1</sup>, Aline Barlet<sup>2</sup>, Maxime Robillart<sup>3</sup>, Patrick Sebastian<sup>1</sup>  
<sup>1</sup>University of Bordeaux; Institut de Mécanique et d'Ingénierie (I2M) - TREFLE département - UMR CNRS 5295; Esplanade des Arts et Métiers, F-33405 TALENCE Cedex, FRANCE; <sup>2</sup>Higher National School of Architecture and Landscape of Bordeaux (ENSAP-Bx), GRECCAU lab, 740 Liberation Course - CS70109, 33405, Talence, France; <sup>3</sup>Kocliko, 74 Cours Aristide Briand, 33000 Bordeaux, France

In Europe, heating accounts for the largest share of final energy (FE) consumption in the residential sector with over 62,8% [1]. That is why in 2012, a European directive on energy efficiency highlights the need to individualize heating costs in collective housing [2]. But tools for managing and accessing energy consumption information are usually considered as unclear, thus accentuating the lack of understanding. This situation can lead to a lack of awareness of the impact of their actions on energy consumption and have the consequence of discouraging virtuous behaviours among occupants [3].

In this context, the primary objective is to help users to achieve and maintain both thermal comfort and energy savings on heating. Therefore, the work approach will focus on two parts. Firstly, carrying out and processing the data from a survey. The aim of the survey will be to identify the difficulties they may encounter, to measure their knowledge of the appropriate actions to adopt, and their needs and requests in terms of energy saving. Secondly, to give occupants the technical feasibility to manage their heating consumption, control devices are provided: thermostatic radiator valves (TRVs). Their design is mainly focused on engineering and control performance at the expense of convenience of use [4]. The use of connected TRVs will make it easier for occupants to use their heating [5]. Furthermore, for us designers, the connected aspect will allow us to collect data (temperature, humidity, setpoint temperature, etc.). The processing of these data will aim to better understand the interaction between occupants and their heating system.

Future work will aim at coupling data from surveys and connected TRVs to offer the occupants personalized and contextualized solutions, for example through a mobile application, to better manage both their heating bills and their thermal comfort.

### **References:**

- [1] Statistics, Eurostat, 'Final energy consumption in the residential sector by use, EU, 2020', 2022. [https://ec.europa.eu/eurostat/databrowser/view/nrg\\_bal\\_c/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/nrg_bal_c/default/table?lang=en) (accessed Nov. 13, 2022).
- [2] European Parliament, 'Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012', p. 56, 2012.
- [3] '2nd International days of the sociology of energy', Jul. 01, 2015. [http://www.socio-energie2015.fr/?page\\_id=416](http://www.socio-energie2015.fr/?page_id=416) (accessed Nov. 13, 2022).
- [4] Wiwe Joergen Seindal - DK, Garm Fester - DK, and Hoelck Poul - DK, 'Valve, in particular a thermostatic valve for heating systems (Patents) - Data INPI' Accessed: Nov. 13, 2022. [Online]. Available: <https://data.inpi.fr/brevets/EP1102145?q=robinets%20thermostatiques%20chauffage#EP1102145>
- [5] C. Gabriel, 'System and method for balancing temperature within a building, connected thermostatic radiator valves (Patents) - Data INPI', 2018 Accessed: May 18, 2022. [Online]. Available: <https://data.inpi.fr/brevets/EP3339754?q=NETATMO#EP3339754>