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## Understanding the conduct of renovation projects in social housing: integrating dwellers' activities, energy and social issues

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### Context

The housing sector is one of the main consumers of energy and emitters of greenhouse gases. It is therefore strongly concerned by issues related to energy transition. In this context, several solutions defined at the European and national levels are implemented in the territories by various housing strategic actors in relation with dwellers. These solutions are based among others on: energy renovation, the introduction of technologies aiming at reducing energy consumption, the promotion of eco-actions and the support of households facing energy insecurity (Maestroni, 2018; Beslay, Gourney & Zélem, 2019). Furthermore, these solutions are largely based on technological promises that do not provide the expected gains (Pellegrino & Musy, 2017) and on a rational and behaviorist vision of human beings that masks the complexity related to the different ways of living (Fréjus, 2019; Guibourdenche, 2013; Subrémon, 2012). Our Phd work in Activity-Centered Ergonomics aims at go beyond this simplified vision of energy management in the housing sector. It is part of an interdisciplinary research with Electrical Engineering and focuses on transformations at work in the "french social housing movement", as a key actor of energy transition in the housing sector. Thus, this research is conducted in collaboration with a private social housing company in the Hauts-de-France region. One of the purposes of this work is to support the transformations that have been initiated in this company aiming at better taking the dwellers' needs into account in the projects carried out. These transformations question the relationship between social housing companies and dwellers, which historically has been built on a paternalistic approach. We are particularly interested in the transformations linked to the conduct of renovation works – which we consider as a process of “re-designing living situations” in a socio-technical perspective (fig. 1) – and in the way in which the dwellers' activities are taken into account in this process.

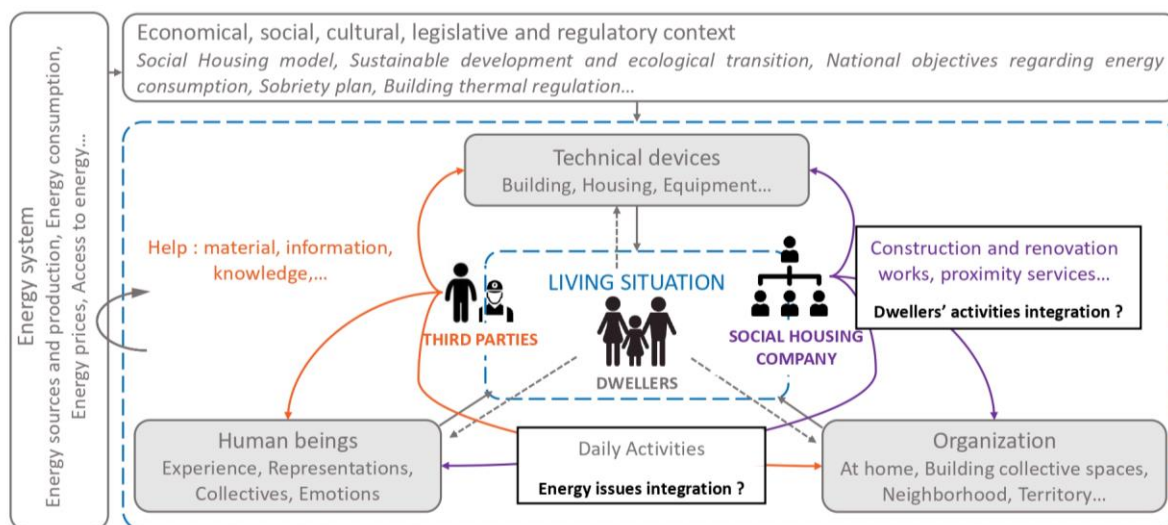


Figure 1 – Re-designing living situations

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According to our model, the dwellers' daily activities are influenced by three main types of factors: (1) technical devices referring to building and housing characteristics, (2) human beings characteristics referring to the household composition and its evolution and (3) organization that concern the household, building, neighborhood and territory levels. Furthermore, living situations define both the dwellers' living environment, as well as the work object of social housing companies and third parties – building companies, associations, institutional actors, etc. In this context, any transformation affecting living situations may mobilize and impact the living environment and/or the work of these three types of actors. This is the case of renovation projects that are important moments in the dwellers' life leading to technical transformations and the introduction of new artifacts that redefine the dwellers' living situations. These projects are implemented by social housing companies – in collaboration with third parties – and aim to improve the energy performance of technical devices and to implicitly promote the integration of energy issues in the choices made by dwellers in the course of their daily activities.

Considering renovation projects as processes of re-designing living situations allows us to go beyond an individualizing vision of energy consumption in housing – which is strongly present in engineering sciences and public politics – and to consider energy consumption as resulting from the dwellers' daily activities in a complex historical, cultural and socio-technical context influenced by activities of various stakeholders. In addition, it allows us to resituate the dwellers among the collective of actors – third parties and social housing workers on the figure – in line with a participatory and activity-centered approach of design project (Barcellini, Van Belleghem & Daniellou, 2014; Béguin, Cerf & Prost, 2010). In this context, we affiliate with other work focusing on designing work systems for sustained development (Duarte, Beguin, Pueyo, Lima, 2015): in our case, it concerns designing living situations for sustained development which refers both to the work activity of the social housing company and to the dwellers' daily activities. We will consider that the conduct of renovation projects consists in articulating two poles: a representation of a desirable future – the intentions put in the projects by the social housing company – and a diversity of actual situations – dwellers' living situations. Establishing a dialogue between these two poles throughout the project management and encouraging the dwellers' participation are, in this context, essential to the project's success.

### *Objectives*

This communication aims at understanding how the intentions to improve the housing's energy performance and the dwellers' living conditions conveyed in renovation projects meet the diversity of living situations. It represents a first step towards achieving this objective which will be pursued in the course of our PhD work. More precisely, we intend to investigate how the dwellers' activities are integrated into renovation projects and their management. Our hypothesis is that this integration is limited by contextual and organizational limits encountered by social housing company. As a result, the will to support the dwellers towards the appropriation of their new housing is reduced to an incentive to accept the renovation works. This leaves the question of appropriation open and also raises questions about the possibilities of developing "energy management activities" for dwellers (e.g. to understand energy issues linked to housing and their living situations, to integrate energy issues to the regulation of their daily activities). In this communication, we intend to investigate (1) the intentions and limits linked to articulating technical and social dimensions in renovation projects, (2) the issue of renovation works acceptance by the dwellers to which that articulation responds.

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## Methodology

Our methodology (Table 1) is based on the thematic analysis of 9 interviews (one hour/interview) with different workers of the social housing company. The workers were identified because of their technical or social role in the housings renovation process. The Renovation and Urban Renewal Director (RURD) and quality manager were met together; the RURD operation manager and the Patrimonial Strategy Direction's director were met twice, individually. We also proceeded to a documentary analysis described in table 1. In line with our objectives, we analyzed information concerning the living situations sought by the social housing company during the project management and the way in which they influence the project. Among the diversity of housings, we've chose to focus our work on the renovation of mining housings, which is at work since the creation of the RURD – and before – because of their poor energy label. Thus, the social housing company and the workers have experience in renovating this kind of housings.

Methods	Persons met / Documents analyzed	Data analysis
Comprehension interviews regarding technical and social dimensions of the social housing company's work	The Renovation and Urban Renewal Direction's (RURD) director, quality manager and operation manager; The Patrimonial Strategy direction's director; a Territorial Unit (TU) manager. Two Social and Urban Development Departments' (SUDD) managers, a support measure manager.	Tasks, objectives and issues of the different services and directions. Technical and social dimensions of these tasks, objectives and issues. Implementation of renovation projects and associated intentions. Dwellers participation modalities.
Documentary analysis	Social survey, works program, renovation management prescribed process, internal documents presenting the company's strategic orientations.	Strategic orientations related to energy transition and renovation. Prescribed renovation project management. Knowledge produced by the social survey and its integration into the works program.

Table 1 – Methods used and data analysis

## Main results: tension between standardization and specificity

The social housing company is committed in a large project dealing with renovation of the most energy-intensive housings in order to meet regulatory obligations imposed on lessors. The objectives are (1) to reduce energy consumption and greenhouse gases emissions from these housings and (2) to no longer rent "thermal sieves" to dwellers, as these housings are a source of health problems and high bills. We find that renovation projects in the social housing sector embraces this double technical and social objective, but that they mobilize and participate to actualizing partial knowledge regarding dwellers' living situations. This knowledge is vague and shared between different services and directions within the social housing company. As a result, and according to our current data, it seems to be used in order to promote renovation works acceptance without clearly integrating stakes concerning the new housing appropriation and the development of energy management activities. However, renovation works acceptance by the dwellers appears to be necessary for the social housing company to maintain the tension between the need to standardize renovation works while taking into account the diversity of living situations. Indeed, housings concerned by renovation projects present various typologies: they are classified into 19 housing families according to different criteria – individual or collective housing, year of construction, materials, construction methods and design specificities. The particularities found in each of these families will influence the possible technical actions specific to energy renovation works, which will also impact the definition of the whole project and its management. Each renovation will therefore be specific, depending on the housing family concerned and in line with other local particularities concerning the neighborhood and the

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dwellers. Mining housings on which we focus our research work are mostly detached houses, sometimes with small spaces and generally with a garden. They are generally heated with gas or coal, are not insulated and have frequent humidity problems. Finally, many mining housings are classified as historical heritage by UNESCO which prevents any act of insulation from the outside and remain limited by the characteristics of the existing building. For example, the structure of the cellars and floors of the mining housings prevents them from being insulated, otherwise the rooms would be inaccessible. In addition, interior insulation is already reducing space and justify the need to move the dwellers during the works which increases the importance given to support measures in order to facilitate this transitions. Despite these specificities, social housing company has to perform a large number of renovation per yer (600), this leads to a tension between taking into account specificities of housings and dwellers and a need to set up a standardized process of renovation to reach the renovation goals. This tension is tangible in the attempted articulation between technical and social dimensions.

### *1. Renovation projects as technical and social projects: intention to articulate these two dimensions*

Issues related to energy transition and sustainable development are clearly included in the strategic orientations of the social housing company at various levels. They are – among others – supported by the Renovation and Urban Renewal Direction (RURD) – created 2020 – which is responsible for programming the renovation of the most energy-intensive housings by 2034, which represents half of the company's stock of approximately 45,000 housings. The current production objective is to renovate 600 housings per year, which will be doubled to 1200 housings per year in 2024 in order to meet the renovation deadline imposed by the legislation. The objective of the renovation works to improve the energy performance of housing is part of a broader objective of improving the dwellers' living conditions, in line with main objective of the social housing company. Energy efficiency improvement works in housing can reduce energy consumption by about 50% and are accompanied by home improvement works. The objectives linked to home improvement works are described by the social housing company as a search for comfort and estheticism coming from the dwellers. The decision to integrate this second component into renovation projects was made in response to feedback from dissatisfied dwellers whose homes were only concerned with energy performance improvement works - which were the initial standards pursued in renovation. The conduct of the projects was then affected by a conflictual atmosphere between the social housing company and the dwellers and required a heavier mediation work focused on reducing these tensions. In addition, a set of support measures suggesting forms of participation for dwellers are integrated into the project management carried out by the RURD:

- Interaction stages with dwellers integrated in the project management: they are carried out during the operation set-up phase and during the works. A social survey is carried out by an external service provider one year before the renovation operation is set up in order to learn about the dwellers' situations concerned by the renovation. Various elements resulting from this survey are integrated into the works program defined by the project manager in connection with the RURD. This program is then submitted for validation by the dwellers' representatives and is finally presented to some of the dwellers on the occasion of a public meeting. Information meetings are then proposed to dwellers during the works and are conducted by the social manager.
- A social manager is mandated by the social housing company to ensure the successive moves of the dwellers during the works, to answer their complaints concerning the works

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and to ensure their satisfaction. The function of social manager is a specific function found in renovation projects conducted by social housing companies. It is identified by all the workers implied in renovation projects as a key function to achieve projects' success.

- Various social and awareness-raising actions defined and carried out by Social and Urban Development Departments (SUDD): these measures are part of an initiative specific to mining housing aimed at "revitalizing" neighborhoods that are for the most part strongly affected by precariousness and unemployment. Different themes can be covered on this occasion. We find in particular the themes of employment – support for dwellers to return to work – and of ecology – creation of shared permaculture gardens and eco-actions awareness. External social workers and local associations are specifically mobilized to carry out these support missions.

We can see here the strong importance given by the social housing company to the technical and social dimensions present in the renovation projects. However, our analysis reveal that these two dimensions seems to remain disconnected – they do not always serve the same direct purpose – and the articulation of the social dimension is done in a distributed manner within different organizational instruments, that questions its efficiency. They mainly serve the renovation works acceptance by the dwellers and, in the end, do not question the technical solutions chosen and their appropriation.

### *2. An articulation of technical and social dimensions focused on renovation works acceptance*

To better understand this search for renovation works acceptance we propose to (1) describe what knowledge concerning the dwellers' living situations is produced by the social survey and (2) explain how they serve defining the renovation works program.

The social survey informs:

- General elements concerning the households' characteristics and the evolution of their composition - age of dwellers, household composition, employment status and household income, specificities (handicapped and elderly persons), planned or scheduled births, decohabitation, pairing.
- Elements directly referring to difficulties related to energy concerns - difficulties in paying bills and calculation of the energy effort rate, humidity problems encountered, feelings of cold in winter - that can be caused or aggravated by the technical housing characteristics and by its ageing - lack of insulation, outdated window frames
- Elements referring to housing appropriation - dwellers' personal adjustments, equipped kitchen, external installations, presence of animals - and to certain dimensions of the activity described in a general way - installations and devices used to move, cook, wash; space occupation modalities; heating modalities.
- Elements concerning dwellers' wishes and opinions on different aspects – works, preserving personal adjustments, neighborhood installations quality – and their interest regarding the project next steps – personal skills to share with other dwellers, willing to participate to information meetings during the works.

These elements enrich the RURD knowledge on dwellers' living situations and are found and completed in the project definition to (1) justify and precise needs concerning energy efficiency improvement works (2) identify needs concerning home improvement works, (3) identify

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potential constraints that could be met during the works – to suppress or take into account according to the situations – and potential resources for the project management. The articulation of technical and social dimensions present in renovation projects seems to be done by the social housing company according to two distinct goals: (1) the social measures are seen as favoring renovation works acceptance by the dwellers and serving the technical project's good conduct and (2) the technical project is seen as an opportunity to facilitate the meeting between the dwellers and the social housing company which allows proposing social measures to more dwellers than usual. This articulation enables some adjustments in the technical choices that are made – particularly for handicapped and elderly persons – and promotes social interaction and dialogue between and with the dwellers during the works. However, the precise nature of the benefits resulting from these adaptations and interactions is not documented by the social housing company, nor are the new constraints that may be caused by the renovation works (e.g. summer comfort, utility and use of new devices). However, we know that the possibility of developing new uses within the housing after renovation works matters in achieving the objectives of reducing energy consumption and improving dwellers' living conditions and health (Zélem, 2016).

### *Discussion/perspectives*

The conduct of renovation projects in social housing can be understood as a process of re-designing living situations which articulate technical and social dimensions. In this perspective, the goals of this process may be (1) to achieve the housings' technical transformations needed to improve their energy performance and (2) to facilitate the appropriation of the new housing by the dwellers and but also support the development of "energy management activities". Articulating the technical and social dimensions appears to be necessary in order to conciliate the tensions between these two objectives. Indeed, the technical transformations (1) can erase the marks of personalization of the housing – works done by the dwellers and decoration – that have a strong affective importance for dwellers and represent a significant financial and time investment and (2) convey a standardized model of action which is often centered on reducing energy consumption (e.g. "eco-actions") and lacks of understanding the different purposes followed by dwellers in their daily activities (Comby & Malier, 2021). We saw that this intention is strongly present in the social housing company but is limited to seeking renovation works acceptance by the dwellers which seems linked to (1) poor cooperation between "technical" and "social" services which act almost independently and diverse standpoints regarding the social consideration, (2) an understanding of dweller's living situations mainly oriented towards the good conduct of renovation works and (3) the standardization issue required to meet deadlines in relation to the size of the housing stock to be renovated and the urgency of energy transition. Although this will lead to renovation works acceptance by dwellers, doubts remain regarding the new housing appropriation and the development of energy management activities (e.g. to understand energy issues linked to housing and their living situations, to integrate energy issues to the regulation of their daily activities). The continuation of our research work will be centered on two axes: (1) a better understanding of the collective work modalities within the social housing company and with third parties during the renovation works and (2) understanding the diversity of dwellers' living situations in relation to the integration of energy issues in their daily activities and their experience of the renovation.

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## Keywords

Working evolutions in social housing companies, Conduct of renovation project, Energy transition in housing.

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