

# Your House is My Home: Tenant Perceptions of Major Renovations including Energy-Efficiency Measures in Multifamily Housing in a Swedish Residential Area

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## Abstract

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Much European housing stock will soon be refurbished due to wear and demands for increased energy efficiency. Renovating residential housing will cause changes in tenants' homes, and how these will be perceived by tenants is poorly understood. In this Swedish case study, tenant assessments of a renovation were captured in group interviews. *Home* includes not only the flat but also common facilities inside and outside the building, resulting in a need for *control* and feelings of *loss* when this environment changes. Perceptions of the renovation were influenced by the social environment, mainly the relationship with the housing company, defined in terms of *distance*, *trust*, and *fairness*. A new ventilation system and limited possibilities to individually regulate temperature were perceived by some as lowering the indoor living quality, prompting various *coping* strategies. Using home as a starting point in planning and managing large renovations may increase the likelihood of sustainable outcomes.

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**Keywords:** block of flats; energy renovation; home; renovation; user acceptance

## 1. Introduction

Much of Europe's housing stock, especially multi-family housing, was built in the decades after World War II and is, or will soon be, over fifty years old. The share of the housing stock (i.e. multi-family and single-family dwellings) built from 1946 to 1970 ranges from 17% in France to 46% in Germany; in Sweden, the share is 37% (The Hague 2010). Many residential areas need extensive renovations due to wear and because housing standards have changed over time. Awareness of unnecessary energy losses and the associated costs is also a driving force of comprehensive refurbishment in order to increase energy efficiency (BPIE 2011). Housing companies, i.e. the private or public owners, initiate such major renovations and it is the building, the housing that is the object in focus.

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Renovations of Swedish multifamily buildings with the triple aim of addressing neglected maintenance, improving housing standards, and greatly increasing energy efficiency often include measures affecting the building envelope and building services engineering.

The maintenance and standard-improving measures include renovating bathrooms, replacing sewage pipes, installing new safety entrance doors to flats, renewing the surface finish of staircases, glazing balconies, and improving the outdoor environment. The energy-efficiency measures can include installing additional wall and roof insulation, new low-energy windows, new building automation systems, and heat recovery from ventilation. The resulting energy savings typically exceed 50% (IEA 2014).

Sustainable renovations need to consider not only technical, environmental, and economic issues but also social ones, to ensure that tenants, i.e. the end-users, perceive the renovation outcomes as providing a good basis for their daily living (Holm 2000; Straub and Vijverberg 2004; Engberg and Houghbølle 2005; Hiller *et al.* 2013).

Refurbishments can substantially improve the quality of life of tenants living in old housing in which acceptably comfortable indoor conditions were previously difficult to achieve (Huber *et al.* 2011; Khatib *et al.* 2011; Chileshe *et al.* 2013) as well as reduce health problems related to the indoor climate (Iversen *et al.* 1986; Howden-Chapman *et al.* 2007; Thomson *et al.* 2013). Other complications can arise, however, especially when the focus of the renovation is energy efficiency, for example, perceived lowered air quality (Noris *et al.* 2013) and symptoms associated with new building materials (Engvall *et al.* 2003). Tenants are also influenced by the actual renovation work (Derbyshire 1992), though they are often not in a position to determine what measures will be taken, when the renovation will occur, or who will carry out the work – i.e. they do not control the situation.

It has recently been suggested that the concept of 'home', in contrast to the more studied concept of 'house' or 'housing', should be the basis of domestic energy research to gain a better understanding of how occupants are influenced by renovation work (Ellsworth-Krebs *et al.* 2015). By using the home as the functional unit, psycho-social aspects, and not just techno-economic ones, can be considered when evaluating large-scale renovation projects. A house or housing is a physical construction, a tangible object, while a home signifies an emotional relationship with an abode (Dovey 1985; van Vliet 1998; Cristoforetti *et al.* 2011) embracing dimensions such as security, comfort, identity, privacy, and control (Kearns *et al.* 2000; Ellsworth-Krebs *et al.* 2015). Improved security is one of the most important aspects of this relationship, from the tenants' perspective, when a residential area is renovated (Vale 1996; Gerdin and Hammarberg 2010; Chileshe *et al.* 2013), indicating the link to the home concept. In our own study, 'living in a home' emerged as a core category in analyses of interviews with tenants. The objective of this paper is to present tenant experience and assessments of a major renovation of their *homes*, a renovation that included measures to increase the energy efficiency of the physical *housing*.

## **Method**

The case study took place in a residential area in Halmstad, Sweden, built from 1963 to 1965, comprising 579 flats owned and managed by the municipal housing company. Tenants pay monthly rent in which heating and water, but not household electricity, is included.

Extensive renovations were made successively between 2010 and 2013, and most tenants lived in their flats during the renovations. The renovation plans were initially presented at a meeting for the tenants as a futuristic vision in which some of the buildings would be demolished and skyscrapers erected instead. These plans were abandoned before the renovation started.

## **Data collection**

The realized renovation measures predicted and measured energy savings, investment costs, and changes in rent for the case study buildings were determined. The data were collected from official reports (Johansson and Patsonen 2010; Mjörnell 2011; Nihlén 2012) and by interviewing housing company representatives.

Residents were invited to participate in group interviews via a written invitation, including a prepaid return envelope, delivered to their mailboxes. Interested parties were contacted by phone to confirm participation and determine appropriate times. A total of 17 tenants (aged 23–80 years, mean 51 years, standard deviation 22 years; 80% female, 20% male) participated, divided into six groups of two to four participants each. An interview guide based on a previous literature review was developed. After an introductory question ('What did you initially think when you became aware of the upcoming renovation?'), it comprised questions treating five themes: (i) recalled feelings and thoughts before the renovation started, (ii) the impact of the renovation when it was in progress, (iii) the results of the renovation and its impact on quality of life, (iv) thoughts about the impact of the renovation on energy consumption, and (v) recommendations for future renovations. The interviews took place in a one-room flat provided by the housing company and commonly used by local associations. Coffee, tea, and sandwiches were served. The interviews lasted 55–75 minutes each. The interview guide was only loosely followed, and participants were encouraged to talk freely. The interviews were audio-recorded and later transcribed by professional transcribers. The participants were compensated for their involvement by being given lottery or cinema tickets valued at EUR 10.00.

## **Analyses**

The transcribed interviews were analysed using a grounded theory approach (Glaser and Strauss 1967), i.e. with an unconditional intention. The participants' own expressions describing what they thought and felt were coded and the codes were collated to form concepts.

The concepts were tested against the text in a constant comparison process. The core category 'living in a home' and other categories emerged before the authors were aware of the work of Ellsworth-Krebs *et al.* (2015).

The results are presented as categories, starting with the core category to which the other categories are connected, illustrated by quotations from the interviews. The results do not say anything about the total population in the area; instead, the purpose was to capture individual thoughts and feelings.

## **Results**

### ***Housing***

The starting point was that the case study buildings needed to be renovated for several reasons. The owners had five objectives for the renovation: to renovate what needed fixing because of wear and tear, to improve the housing standard, to address radon levels exceeding the building code limits for new construction, to improve thermal comfort, and to improve energy efficiency.

Various renovation measures were initially considered and analysed. The final renovation measures were combined in a renovation package and most of the measures were needed to varying degrees because of wear and tear. One renovation measure was carried out solely because of wear and tear, i.e. renewing the surface finish of staircases. The bathrooms had been renovated previously. Renovation measures carried out mainly to improve the housing standard, but also because of wear and tear, were installing new safety entrance doors to the flats, renovating common laundry rooms, glazing balconies, improving the outdoor environment, and installing new burglar-proof storerooms in the basement. One renovation measure was carried out mainly to improve the energy efficiency and to address the high radon levels, i.e. installation of mechanical ventilation with heat recovery.

Renovation measures carried out mainly to improve the energy efficiency and thermal comfort were additional insulation of the roof and the infill walls behind the balconies, improving the air tightness of the building envelope, installing new low-energy windows, installing new thermostatic radiator valves, and adjusting the heating system. Renovation measures carried out mainly to improve the energy efficiency were constructing new district heating substations and new district heating pipes between buildings as well as installing new energy-efficient washing machines in the common laundry rooms and new low-energy lighting in common areas. The above renovation package resulted in an average rent increase of 15% and a 35% reduction in energy use. The on-site renovation phase lasted up to six months.

### ***Home***

The invitation to take part in the interviews attracted tenants who wanted to tell their stories about the renovation; many of them described in detail how they reacted and how they felt.

The parts of the renovation praised by participants often concerned improved safety and aesthetics. Other renovation outcomes were questioned by some, who perceived less comfort in their apartments in terms of air temperature and ventilation after the renovation. Technologies installed to improve the energy efficiency were not of interest to the participants, some of whom felt that they just led to increased rent. There were some complaints regarding the disturbance during the construction phase. Several factors, other than the assessment of the actual renovation and its outcomes, were identified that might determine the likelihood of acceptance of the renovation measures. In this, the tenant's relationship with the flat and its surroundings as a home was found to be fundamental.

### *Living in a home (core category)*

The renovated buildings do not, in the view of the participants, comprise just flats, but rather the tenants' homes. Physically, the home could be the same as the flat, but was often extended to include the stairwell, storage facilities, laundry room, and outdoor environment, especially for those who had lived long in the area. The home also had connotations other than the built environment. The renovation was therefore not just a technical matter, but a change in the circumstances that enabled tenants to feel at home. An essential quality of a home is safety: a home is a place where a person should be able to feel secure. Comfort and aesthetics were mentioned by the participants as other qualities that define a home.

P8: I think it's really good what they've done in the stairwell. It's perfect the way it's been painted in grey and blue. It fits in perfectly. It's nicer. I think it's nice.

P10: This in particular I think feels good. That we got it glassed-in. It feels ... I think it's cosy. It became like a little conservatory, plus it's a bit safer too.

The tenants' perception of the renovation as concerning their homes was manifested in great care for the flats and buildings. Several participants expressed worries about the quality of the renovation and how it had been carried out. They were concerned that the building company should get the best value for the money spent on the renovation. The renovation quality also had an impact on the tenants' future daily lives as they had to live with the outcome of the renovation. Furthermore, this great care also meant taking responsibility for keeping the buildings neat and looking after other tenants.

P1: They should have someone – in the same building – they could have done what you could call a 'host' for the tenants who live in the building. They could ask ... It needn't be [so costly]. It could be a symbolic sum or something like that ... And I'd have been happy to do it voluntarily.

Having one's home changed at the initiative of someone else was in itself problematic. In particular, having strangers inside and outside the flat during the renovation process assaulted the tenants' integrity and was perceived as an invasion of privacy.

P10: Yes, I think it [i.e. the renovation period] felt long. I was very frustrated for a while. Oh, I was so tired of it. You had no private life. You were going into the shower and everything had to be closed properly, and the same when you got dressed...

P15: That's what was a pain, that you knew they [i.e. the workmen] were coming, but not when they would come. And you didn't know if they'd been there when you came home and sometimes you came home and there was a man in the living room doing something with a window. So it was a bit ... You never knew if there would be someone in the flat or not when you came home.

The acceptance of the renovation process and especially the results of the renovation could be viewed in terms of the tenants' being able to maintain, or even improve, the sense of being at home in their flats. The possibility of acceptance was associated with the relationship with the social environment in terms of distance, fairness, and trust. Tenants' perceptions of being in control and feelings of loss, and how the tenants handled the situation with the help of coping strategies, were other factors shown to be of importance.

### *Distance*

Many participants referred to the housing company using the terms 'them' or 'they'. 'They' had no name or face, but constituted an abstract concept revealing a distance between the tenants and the company. This distance seems to have become established when the first vision of the renovation was presented. As the participants saw it, this vision was unrealistic from the outset, and they were not surprised that it was not carried through.

Other people involved in the renovation and in the daily management of the site were mentioned by name. Some of these people were considered more trustworthy than others. Personal contacts between the manager and tenants led to a sense of belonging, as the manager became part of the social environment, if not the home. Receiving information directly from this person and the belief that she would take care of any problems created confidence.

During the renovation, several participants also developed relationships with the tradesmen who carried out the work.

P15: We were really lucky, we had very pleasant ...

P16: Yes, exactly ...

P15: ... construction workers who were there. It was, it meant a great deal too that they were so very pleasant and they showed respect too.

If the work performed by the tradesmen was not perceived as well executed, it was not seen as their or the subcontractors' fault. The problems were instead referred to the housing company that hired the wrong people or chose the cheapest offer during procurement. In one group, the new outdoor environment was discussed and described as dangerous because the construction workers had been careless and left some loose stones that it was easy to stumble over.

P11: Yes, but then you can't blame the workmen because ... We can't blame them. Not anyone.

P10: No, I don't think so [either]. They've done as well as they could.

P11: [...] Instead it's what the housing company, what they themselves see as the whole and what security they want. What work they want done. [...] They get what they pay for.

The sense of distance between the housing company and tenants that many participants mentioned was explained by some participants who were long-time tenants as connected to the subcontracted firms that now handled many of the daily operations. They were seen as not having the same sense of what needs to be done and as not doing their job with the same care as the former caretaker had done.

### *Fairness*

Whether or not the renovation was accepted was also associated with a perception of the process and the outcome as fair. Fairness included several relationships: fairness between tenants, fairness between different residential areas for which the housing company is responsible, and fairness between tenants and the housing company.

Unclear rules and rules being changed were perceived as annoying. Tenants who had chosen previously offered options and therefore incurred extra costs felt unfairly treated when the major renovation meant that they no longer benefitted from these installed options. Feeling that one has been forced to agree to a change formerly perceived as voluntary created a sense of powerlessness: what occurred was on someone else's terms and conditions.

P8: We got the note asking about whether we approved this decision or not, and then got the note that even if you didn't approve you still had to accept ... Because they've made the decision that it would be like that anyway. [...] If I got the information, I knew that someone was coming and would do [something]. But I never thought about how they'd do it; they'd just do things the way they decided. [...] They just said, move the furniture, they must have room to move, and that they need space, so you always had to move ...

Equal treatment of the tenants and not feeling disadvantaged were important. Some measures observed by the participants were interpreted, rightly or wrongly, as unjustified benefits for tenants in neighbouring units.

P2: Why have they invested in wash stacks, washing machines, such nice things downstairs? Is it for those in the opposite building? And afterwards, when I think [about it], I almost get mad, as they got big extended balconies, glazed-in balconies. My building, where I live, it was a so-called listed building.<sup>i</sup>

The strong demand for fairness also influenced the tenants' view of the rental increase in several ways. It was easier to accept a rental increase for a change that one thought of as beneficial for oneself, for example, increased security, than one perceived as of no value or even disadvantageous to oneself.

P6: Security is something I'd gladly pay a hundred crowns or so a month for. So that I get to keep my bike or my car or whatever. Because it's ... it's my things. [...] But to buy the energy-saving thing up on the roof ...

Financial compensation for inconvenience experienced during the renovation was called for. The request was made in relation to the actual situation, such as decreased access to the rented area.

P4: You could have been compensated for much of the inconvenience in some way or another by their lowering the rent. So even if it was just symbolic, they would nevertheless show that they took into consideration that we didn't have any basement or any storage rooms for six months.

The parts of the renovation outcome perceived to contribute to orderliness were, in line with the high demands for fairness, praised. Examples were the new booking system for the laundry room and the mailboxes in the entrance halls. In these cases, the demand for fairness was met on a longer-term basis.

### *Trust*

From the participants' perspective, there was sometimes a gap between what they were told and what they could see with their own eyes. This was especially obvious when it came to energy-saving measures. To be informed that certain measures would increase energy efficiency, but then to observe the changes and perceive that nothing seemed to have been gained, created distrust in the housing company.

P1: Some of the windows were rotten – they were the type you could open in two sections. Now they're the ones where they put in what they called triple glazing, but there's no more than two panes of glass in them anyway. So you can ask what U-value those windows really have.

P2: But they're really nice. You don't think there's any value in them, you mean?

P1: Yes, they can have value ... But they're equivalent to the windows that were there already.

Not being believed or not being treated as an equal partner also led to suspicion towards the housing company. One participant spoke of an incident when she realized that caulking was missing around the windows in her flat after window replacement, and therefore contacted the housing company. She expressed feelings of not being listened to or not being believed.

P6: But what's stupid about this is that the housing company then ... almost contradicts you when you come and say that it's not sealed. So it you feel really stupid.

Participants who had contacted the housing company after the energy renovation and said that they felt that it was now too cold felt neglected. In some cases, this led to despair and resignation.

P14: Hmm ... I don't think they'll change their minds. They've been twice and adjusted the heat in our place. It hasn't got any warmer. [...]

P15: Feels mostly like they're doing it to save money. They don't care much if you're freezing or not. It's their 21 degrees that apply. That's the way it is then. I don't know. That's what I think anyway.

The frustration at not being listened to when one's home is subjected to changes was expressed in terms of the existence of a buyer-seller relationship between tenants and the housing company.

P12: For, after all, it is the tenants who will live there, and pay.

### *Control*

The feeling of not having control over the situation evoked frustration, both during and after the renovation. Situations that took place in the flat could counter efforts to keep the flat comfortable and well-maintained.

P2: You haven't covered the floor, I said. Then they were standing over there, just inside the corner. No, but it's not necessary. This is nothing that causes damage. Nothing that causes damage? It's four layers of wallpaper and there's plasterboard and everything. And you stand there with your big boots and trample on it, on my linoleum floor.

Some of the changes made to increase energy efficiency meant that individuals could no longer control the indoor climate in their flats. Some participants perceived this as meaning that they would not be able to meet their individual needs.

P8: You can't decide yourself what heat you want in the flat. They've locked it in some way so you can't adjust it. [...] They've changed it in some way. They've blocked them [i.e. the radiators] in some way, so you can't change, can't decide yourself. [...] Some like it a bit warmer, others a bit colder.

### *Loss*

The outcome of the renovation matched the lifestyles of some participants with, for example, more modern equipment in the laundry room, while others perceived their needs as going unmet. They thought of the changes as for the worse and expressed feelings of loss.

P11: Because before, you could put mats on the floor to scrub them. But that's gone. Now you can't because it's not possible.

P10: Yes, I miss that. [...] We can't scrub our mats. It was so lovely to hang them out and that.

Some participants also expressed a general feeling of loss. This loss was partly associated with the more frequent tenant turnover nowadays. The loss of a past social environment possibly occurred independently of the renovation, but the renovation was perceived as enhancing the likelihood of people's moving out as it led to increased rents.

### *Coping*

The participants described several modes of coping with the inconvenience experienced during the renovation and afterwards with the – in their view – negative outcome of the renovation. One participant, who worried a lot about the renovation, mainly because it would mean increased rent, describes how she did not believe that the balconies would indeed be changed – a denial strategy.

P9: Yes, I lived a bit like, so that I thought, it won't happen, because there are many people who say that they only do it [i.e. use the balcony] when they go out to smoke, so it won't happen.

One coping strategy the participants used was to take matters into their own hands and act constructively. Such actions were successful if they had the desired outcome.

P2: I couldn't live in my flat, but I didn't know where I could go. I've got a cat. I've got a kind friend so I got to use her cottage. Otherwise I'd have ended up in a lunatic asylum, both the cat and me. Because we couldn't be at home and live in this mess.

P12: I'm happy with the flat and all that, but there's this draught and it's cold, because I mean ... But I've invested in one of these heated mattresses ...

Another way to take action was to contact the housing company. This was sometimes successful as the company would send someone to deal with the problem. However, if this coping strategy was not successful, i.e. the matter was not resolved properly in the tenant's view, it led to helplessness and resignation.

One participant had several problems in her flat, one being that the hot-cold water mixing control valve did not keep a stable temperature. She has tried to think of this as a small matter compared with other problems that people have, thereby making it seem trivial, but she has not totally succeeded.

P7: In view of other people's ... I mean, life situations, so I think, okay, you can live with it. [...] But no, it's that every time you're going to shower or wash up you feel, oh, now there'll be problems. Now there'll be problems again like this. So it'll take a bit of time and you don't feel like doing such things any more.

## Discussion

The invitation to take part in this case study may have attracted tenants with stronger negative or positive experiences of the renovation than others', but the overall impression is that the participants conveyed a nuanced picture that improved our understanding of how renovations are perceived by people living in multi-family housing. The study did not attempt to capture the average satisfaction of the residents, as done by the quantitative surveys with predetermined questions commonly used in evaluating such matters (e.g. Speicher and Potter 1993, Dinç *et al.* 2014); such methods require large samples and high response rates to be useful. Qualitative approaches provide insights that are not captured by traditional surveys (Varady and Carrozza 2000), and the group interviews gave us an opportunity to listen to the residents without preconceptions.

The category *living in a home* emerged fairly early in the analysis. The concept of 'home' implies a relationship between people and their environment rather than the physical environment itself (Dovey 1985). Such a relationship depends not only on the physical environment but also on the social environment and on individual resources (Küller 1991). As to its physical constituents, in this study, the home apparently comprised the flat as well as other spaces within and around the building, as described by the participants. Changes made in this territory could be regarded as threatening the bond between the tenant and the physical environment that defines the home (Taylor and Brower 1985).

This was expressed in terms of *loss* in descriptions of what the participants missed from what had existed before the renovation. The influence of the social environment on how the renovation was perceived was manifested as the *distance* from those responsible for or managing the measures, the demand for *fairness* in how the building company treated the tenants, and how much *trust* the tenants had in these stakeholders. A previous study of response to changes as such found that a change is more likely to be regarded as for the better if the social environment is experienced as providing opportunities for participation in the process (Pedersen and Johansson, 2014). In the present study, the participants said that they had not received enough information about how the renovation would be carried out, especially about when tradesmen would be in their apartments.

This experience of intrusion is understandable if the apartment is understood as the most private part of a home. The planning of the measures would probably have resulted in alternative implementation if the measures had been regarded as changes in a private home rather than in an apartment building.

Several participants in the case study were initially worried about how much the renovation would increase their rent. How much the rent would rise depended on what renovation measures were considered to have raised the housing standard (and could thus justify a rent increase) and what were considered maintenance (and could not justify a rent increase). It has previously been suggested that tenants place a higher value on visible features (e.g. double glazing) that also produce ancillary benefits (e.g. noise control) rather than on those that have the greatest effect on energy efficiency (Phillips 2012).

Improvements in flats, relative to those in the building as a whole, are stressed as most important (Vale 1996). Some energy-efficiency measures will therefore be perceived as more beneficial than others, just by being visible and impinging on the tenants' daily lives, and thereby improving their homes. In the present study, most of the realized renovation measures were discussed as affecting the sense of home, directly or indirectly.

The most visible measures were also mainly regarded as beneficial (e.g. the renewed surface finish of staircases, previously renovated bathrooms, new safety entrance doors to the flats, renovated common laundry rooms, glazed balconies, improved outdoor environment, new burglar-proof storerooms in the basement, and new low-energy lighting in common areas), but did not, apart from the lighting, have energy efficiency as their main target.

Measures perceived by other senses (e.g. installation of mechanical ventilation with heat recovery, additional insulation of the roof and the infill walls behind the balconies, improved air tightness of the building envelope, new low-energy windows, new thermostatic radiator valves, and adjustment of the heating system) contributed greatly to the reduced energy use but were not always seen as improvements, though they may have improved indoor air quality (invisible) and theoretically the thermal comfort. The identified gap between the information provided to the tenants and what they perceived indicates that such information should be better designed. New district heating substations and pipes between the buildings were not commented on, as they did not obviously affect home life. Feedback on energy savings and transparency concerning the relationship between energy costs and rent could contribute to tenants' sense of inhabiting homes.

There was tension between some of the energy-saving measures and the needs of participants in their homes. Thermal comfort has previously been found to be the most important factor determining overall satisfaction with the indoor environmental quality (Frontczak and Wargocki 2011). However, some of the energy measures examined here were not that successful with regard to thermal comfort. It seems that the perceived, and possibly actual, indoor temperature was lowered in at least some flats.

A lower temperature does not automatically mean less thermal comfort if the thermal insulation and air tightness are simultaneously improved, i.e. if draughts through a leaky building envelope are reduced, as was the case here.

However, the ventilation system was also upgraded from passive stack ventilation to mechanical exhaust ventilation with air inlets in the building envelope, likely increasing the air flows and resulting in lower perceived comfort. Providing people with the possibility of controlling their indoor environment improves comfort (Frontczak and Wargocki 2011); in this case, the tenants instead lost that control when the new thermostats were installed. Instead of by increasing the temperature, a few tenants found other ways to cope with the decline in thermal comfort. Using electric heaters to compensate for the low temperature helped increase the comfort, but could be seen as partly cancelling out the reduced energy consumption for heating as calculated and measured by the housing company.

Instead, as household electricity was paid for individually by tenants, there was effectively a transfer of heat costs from the housing to the home.

## Conclusions

Using the 'home' as the unit of interest in research into energy-efficiency measures, as suggested by Ellsworth-Krebs *et al.* (2015), seems to be a useful way to gain a deeper understanding of how people perceive an energy-renovation process and its outcomes. We also propose that the home concept should be integrated into the planning, communication, and realization of large refurbishment projects.

It is important to take into account that residents live in their rented flats, which therefore constitute their homes. People who rent their dwellings have the same relationship with their homes as do home owners (Kearns *et al.* 2000). One crucial consideration is whether the flat still feels like a home after a renovation, and this seems to be especially important to long-term residents.

After all, a major renovation with or without energy-saving measures can change the aesthetic expression of the building as well as the comfort and safety conditions in its outdoor and indoor environments. Physically the home is the flat, but often the attachment to the building expressed as feeling at home includes the adjacent stairwell, storerooms, laundry room, and the outdoor environment, especially for those who have lived long in an area. The complexity of intervening in someone's home must not be underestimated. Measures that have an impact on homes should be explained to and have the support of their residents.

The risk of renovation-caused changes being perceived as uncontrollable threats is reduced if the social environment invites dialogue, so that those tenants who wish to participate in the renovation planning process and thereby affect changes can do so.

Information provided to tenants about why the energy renovation is being carried out and about its local and global implications (in terms of the environment) is difficult to design and deliver. Regarding the importance of trust identified here, creating a social climate incorporating true communication, rather than one-way information provision, could well be an initiative that would pay off in the long run.

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<sup>i</sup> The balconies were classified by the municipality as interesting architecture of its time and were not to be changed.