

Article

A User-Oriented Ethnographic Approach to Energy Renovation Projects in Multiapartment Buildings

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Abstract: The paper presents the activities related to ethnographic research in the Italian demo-case adapted to the needs of the TripleA-reno EU project (Affordable, Attractive, Accessible deep renovation). The overall study methodology is focused on the four phases of the People-centered development strategy, which focuses on the core idea that “knowing people” should become an integral part of energy renovation development processes as a means of achieving new categories of products, services, or business strategies. Ethnography is a typical methodology of anthropology. It is based primarily on the end-users observation, during which the researcher is directly involved in the daily activities, interactions, and events of a group of people. Involvement is intended as a means to learn the explicit and hidden aspects of an end-user’s daily life. The primary objective is to understand interactions between building occupants and the building itself, as well as their relationships and roles within the renovation processes. Implementing this research in the Italian case study has made it possible to form a knowledge base on the opinions of the subjects involved at the national level. The application of simplified ethnography methods combined with an appropriately studied questionnaire, conveyed through a web form, allowed for gathering useful information. The quantitative questionnaire data collected were then compared with the open-ended interviews collected from the residents of the Italian demo case building that was undergoing a forthcoming renovation. By confronting European, national, and demo case levels, it was possible to verify how the resident attitudes change concerning the energy renovation processes once directly involved. The aim was to understand which most stimulating factors have to be considered in order to make the end-user onboarding and renovation project experience more affordable, attractive, and accessible.

Keywords: applied ethnography research; people-centered approach; accessible affordable attractive deep renovation; Italian social housing; user-oriented energy renovation; user-oriented energy efficiency

1. Introduction

TripleA-reno [1] is an EU project to promote the large-scale energy renovation of Europe’s existing building stock and allow individuals and communities to benefit from such improvements. The aim is to speed up the decision-making process and make it affordable, attractive, and accessible to customers and end-users. The goal is to create better indoor comfort for occupants through near-zero energy renovations and provide customers and end-users with interesting, understandable, and customized information about real building efficiency. To this end, TripleA-reno will create a gamified shared framework to promote decision-making while maintaining a continuous flow of communication

between users and developers to ensure a people-centered product design. The expected outcome of the project is to create and provide end-users with useful online tools to simplify access to individual renovation procedures, speed up the overall renovation process, and ensure high-quality results.

The first goal of the project is aimed at understanding the contexts in which energy renovation processes are activated. Several to-be-renovated case studies in the different EU Member States have been used to achieve this objective. As the TripleA-reno project is focused on end-users and other people involved in the renovation processes, the combination between quantitative studies and the use of qualitative ethnographic field research methods is optimal to illustrate how location-specific contexts influence energy refurbishments. The analysis and cross-comparison of the results between the different case studies will show the complexity inherent in the renovation processes by taking into account the everyday realities, motivations, and issues faced by all the actors involved.

This study focuses mainly on the Italian experience and aims to highlight how the TripleA-reno path to renovation has been carried out in a specific demo case, a multi-apartment building, located in the Venice province, managed by ATER Venezia. Deep energy and seismic renovation plan have already been launched on this building to improve facades' insulation, internal comfort, and building static safety. The first part depicts a general framework of the case study. It includes some historical, economic, and geographical data on the location, followed by a section dedicated to the building and its occupants. The introduction helps us to understand the situation in the field and illustrates the building current general condition as a physical and social entity. The second part is a systematic analysis of the information gathered through open-ended field interviews with residents. The results were categorized according to the main topics of interest in the project (affordability, attractiveness, and accessibility). The final part will compare the results acquired on a national scale through the deployment of a questionnaire, suitably constructed to understand the users' opinions about the energy renovation interventions, with the specific ones collected in the case study building. Even if the research is limited to the Italian demo-case, it gives an interesting insight into the applied ethnography approach adopted by the project in other national contexts, and the results acquired are important to understand how to define better the energy renovation user-oriented online tools that will be implemented in the TripleA-reno gamified platform.

2. Materials and Methods

2.1. Applied Ethnography Approach

Methods and tools related to cultural anthropology and ethnography were adopted to more precisely identify how developers should implement the characteristics of end-users in order to create a more user-oriented platform.

Ethnography's primary aim is to evaluate and integrate existing fragmented expertise and experience in the creation of people-centered goods, and to present them in an accessible and concise manner. The core concept of people-centered development is that individuals, as "end-users" or clients, should be involved in the development or enhancement of goods and services based on experience mapping and direct knowledge. In order to encourage researchers, designers, and engineers to work with people during the design and development process, a variety of tools and techniques are available. An ethnographic study, as implemented in TripleA-reno, consists of four basic phases that follow the principles of human-centered development:

1. Identification: The first step is where researchers and people, as main target user groups, define which issues are already solved or are their priority.
2. Analysis: In the second phase, researchers from the social sciences and humanities explore and evaluate the needs of consumers, using and integrating various methods. This is how scientists learn about the everyday lives, behaviors, and preferences of individuals to find out what they need and want.

3. Interpretation: The third stage relates to perception. Researchers prepare suggestions for design and implementation based on test findings and in consultation with developers and end-users.
4. Design, development, and testing: The fourth phase assures optimal user experience. At this point, when researchers and developers already have a product or service prototype, the core question is why and how important, useful, and meaningful to people the newly developed solutions are.

Some approaches and methods widely used in people-centered design and implementation are described in this paper: open-ended interviews, focus groups, participant observation, rapid assessment, and field visits. In doing so, consideration must be given to what kind of data can be obtained using such a research method or technique and how this relates to research needs and goals [2].

Elizabeth Sanders' "Design Research Map" [3,4] is a valuable guide and starting point for identifying the cross-cutting fields of study and procedures in people-centered research approaches and production methods. In this map, Sanders identifies current design research types/approaches as "zones" (large circles), "clusters" (larger bubbles inside zones that indicate professional organizations' presence and support), and "bubbles" (smaller bubbles that are not yet endorsed by professional organizations). Bubbles are located in a Cartesian plane where, based on research or design, the vertical dimension is determined by the form of approach. "the research-based perspective has the longest history and has been guided by applied psychologists, anthropologists, sociologists, and engineers" [4]. Instead, the horizontal dimension represents the "mentality of those who practice and teach design research" [3].

In a second map, Sanders is superimposing, on the design analysis map, the "People-Centered Innovation" model [5]. Clearly, in the design/development phase, people-centered innovation (development) is geared towards the participatory model, where "users" become "involved co-creators". Three key styles of research are defined by the model: applied ethnography, participatory design, and lead-user creativity. In 2006, Sanders introduced this map for the first time as a "cognitive collage" of design studies that still took shape. She subsequently updated some specifics in 2008 and invited others from their perspective to work on the map. This overview must take into account the most recent and evolving field of design anthropology that can be put at the intersection of People-Centered Innovation and User-Centered Design zones [6] in order to assess the TripleA-reno project's own instances.

The fundamental understanding that "buildings consume energy" (and not people who live or work within them) is still prevalent when it comes to energy efficiency. The definition of technological potential has been a fundamental tool for the energy efficiency industry and is focused on engineering and economic estimates carried out "without thinking about the possibility of successful implementation" [7]. These methods focus primarily on the effect of energy usage—e.g., by increasing the performance of devices and systems and by adjusting and enhancing their technological characteristics. Economic metrics have helped to justify and direct engineering reform, believing that cost-effectiveness is an acceptable measure of social gain. A possible technological scenario assumes that energy management technologies are suitable for all building configurations, infinitely or at a lower cost, and "have no economic, social, psychological risks that would dissuade customers or organizations from implementing them" [8].

This form of tendency does not put enough focus on people living or working in buildings and overlooks the vital impact of their individual actions, beliefs, attitudes, motivational factors, and other behaviors related to energy usage. Research has concentrated mainly on modifying the actions of individuals with regard to constructing devices and envelopes, rather than considering the social environments, occupational cultures, institutional norms, and technical landscapes that form our behaviors and practices. In this arena of technological capacity, human beings indirectly join as drivers of energy needs and economic agents assessing and buying products for cost-effectiveness on the basis of anticipated savings. In this sense, people are not seen as the producers of improved energy usage, but rather as troubling causes or obstacles to such change, since they are unable to grasp what is in

their interest. The results have been a series of top-down views on people and energy use that cannot consider heterogeneity, social structure, or interests beyond energy and economy.

These models are not based on real observation and have minimal capabilities to incorporate context variability. The research carried out aims to improve the understanding of the sociotechnical context and the specific practices that influence the human–building interaction [9]. Using wrong models also limits the ability to identify and understand key elements that can be used as behaviors and social levers to improve the effectiveness of retrofitting. Designers often make unrealistic assumptions about how people will behave, as if they do not capture their diversity, but focus on what occupants “should” do. In short, the technical approach leaves little room for the social variable and forgets benefits and costs other than energy and money [10].

EU policies and actions are focused on raising consciousness about climate change, but there are clear signs that the introduction of energy-saving initiatives does not always result in the anticipated reduction of CO₂. The central role of occupants in achieving energy savings is increasingly recognized and is even more critical in the social housing sector, where the environmental benefit is coupled with the social goal of reducing inequalities [11].

However, since this article is primarily focused on the understanding of people’s habits and attitudes towards energy renovation interventions, the main focus will be on the survey phase divided into identification (Phase 1), research (Phase 2), and interpretation (Phase 3) [12].

2.2. The Collaboration with Ater Venezia

When the central function of occupants in achieving energy savings in residential buildings has been assumed, rigorous simulation systems are considered to be the specific measures to take into account occupant behavior. Since most of the residential buildings that will constitute housing stock in 2050 have already been constructed today, building simulation techniques need to be modified to help the rehabilitation of existing housing stock by the use of occupant behavior modeling [13,14].

In order to optimize energy usage in existing residential buildings effectively, the first step is understanding the interrelationship between inhabitants, building systems, and behavioral aspects in order to determine both the direct and indirect influence of each of these aspects [15]. A variety of studies, both in the social and technological fields, have been published with the goal of studying determinants of user behavior and patterns of consumption. The methods of investigation consist mainly of data collection by surveys and interviews, observations, readings from meters and figures, used individually or in conjunction with each other, while the type of energy use considered differs from heating to cooling or appliance use [16–19].

The chosen Italian case study, to exploit occupant behavior modeling inside the TripleA-reno platform, is a social housing building managed by the “Agenzia Territoriale per l’Edilizia Residenziale di Venezia” (ATER Venezia—[20]), which, under Regional Law no. 39 of November 03 2017 and its own statute, is a public economic body of the Veneto Region operating in the Venice residential building sector and has legal personality and organizational, asset and accounting autonomy.

ATER operates throughout the province of Venice, coordinating the design, construction, purchase, renovation, and management of social housing. By renting housing at reduced rates, it contributes to the creation of housing supplies in order to meet the needs of people who do not have the economic means to turn to the private real estate market.

ATER Venezia has long been sensitive to sociological and anthropological aspects related to the management of its buildings. Between 2016 and 2019, it promoted, in collaboration with ATER Matera [21] and the Architecture of Shame collective [22], the research “Investigation on the Non-Inhabitants”, which led to the announcement of the “Design Competition for Serra Venerdi”. The main outcomes of the competition were exposed during the Architecture of Shame exhibition included among the events of Matera Capital of European Culture 2019 [23].

The objectives and specific requests of the competition are the results of archival research and dialogue with inhabitants and specialists on the social housing theme that involved Matera and its

political and cultural institutions. The competition was aimed at multidisciplinary groups composed of building and landscape architects, social science experts, and artists who were asked to develop a strategy for the redevelopment of public spaces in the Serra Venerdì [24] district combining a physical intervention on the space and a social, economic and cultural renovation strategy of the neighborhood [25]. This work compares two social housing districts, the Campo di Marte district inside the Giudecca in Venice and the Serra Venerdì district in Matera, both designed by famous architects [26].

2.3. The Case Study Building

ATER Venezia, as a supporting partner of the TripleA-reno project, suggested a case study building located in the municipality of Concordia Sagittaria, near Portogruaro, in the Venice province. The operating management of this residential building implies that none of the 21 houses are privately owned, but all the occupants are tenants. The property ownership and, therefore, its maintenance and conservation are the responsibility of the ATER Venezia. The renovation process, in this case, must start directly from ATER, which has planned to carry out the interventions both to satisfy some of the tenants' pressing requests and to have access to regional and national funding in order to reduce the final cost of the renovation.

Before going deeply into describing the carried-out activities, it is useful to briefly describe the urban context that characterizes the property location, as this will turn out to be essential to understand some significant findings of the analysis. Concordia Sagittaria is an Italian city of 10,380 inhabitants, which is part of the metropolitan city of Venice. In Roman times it was part of the Regio X Venetia et Histria. Recent excavations have brought to light the remains of warehouses, Domus, thermal baths, wells, and sections of the Decumanus Maximus. The case study building is located near one of these archaeological sites in the north-west part of the city and can enjoy a direct view of the public greenery in a quiet area away from the busiest areas of the city

2.3.1. Architectural Conception

The building develops longitudinally along the east-west axis, exposing the more windowed facades to north and south. The building, constructed between 1977 and 1978, is owned by ATER Venezia and hosts 21 apartments on four floors above ground. Considered as a whole, it has an elongated rectangular shape (80 m long and 12 m wide), divided into two main blocks (Figure 1).

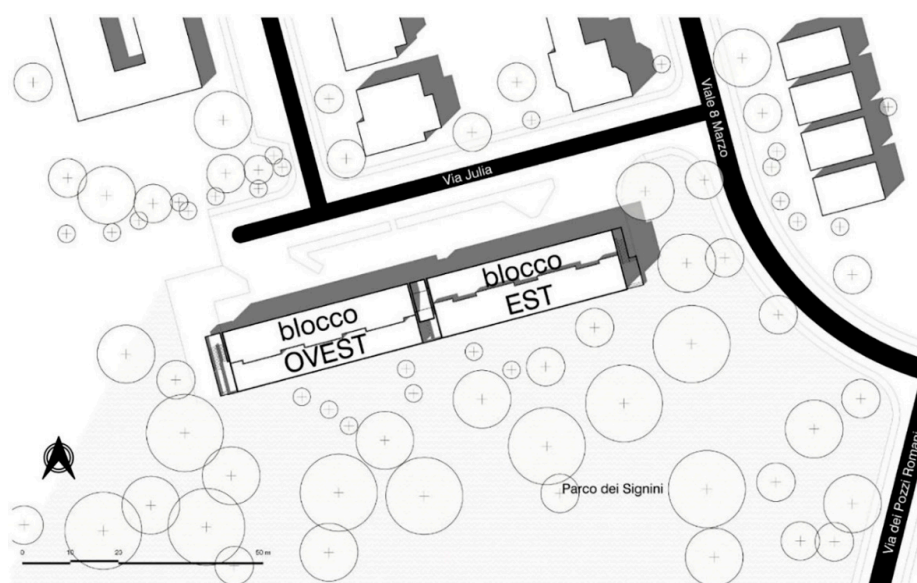


Figure 1. ATER social housing building lot in Concordia. The building is inside the “Signini Park” near the roman ruins of the “Domus dei Signini”.

The ground floor is divided longitudinally into a garage area overlooking access from the road and a slightly raised rear porch connected to the public park. The eastern block rises four stories above ground and is made up of specular semi-duplex apartments, the western block rises three stories above ground and is made up of single-story apartments on the first floor, while the upper stories are made up of semi-triplex apartments. All the dwellings are served by three staircases placed, respectively, at the sides and the center of the building. Access to the dwellings is granted by a longitudinal walkway that extends along the longest side of the building. The flat roof is not accessible and is also staggered longitudinally by half a floor. On the street side, the building is 12.00 m above ground level, while on the public park side, the western block is 10.20 m high and the eastern block 13.50 m (Figure 2).



(a)



(b)

Figure 2. ATER social housing building in Concordia (a) the north facade towards the street; (b) the south facade overlooking the public park near the archaeological park.

As mentioned above, access to each dwelling is granted by three staircases designed as autonomous structures separate from the main blocks. The central stairwell is located between the eastern and western blocks, while the other two stairs are located at the extremities of the building (Figure 3). The stairs lead directly to the external walkways, which extend along the entire length of each main block and allow access to all the apartments. The architectural concept is therefore based on similar or specular apartments, arranged one above the other, repeated several times along the longitudinal

axis. This arrangement seems to favor a logic of prefabrication, even if the construction is made of traditional reinforced concrete, and the use of prefabricated solutions is minimal.



Figure 3. From left to right: western, central and eastern stairwells leading to the external walkways.

2.3.2. Structural Conception

Based on in situ observation and the project drawings study, the building load-bearing structures consist of reinforced concrete pillars and lowered beams, weakly reinforced concrete partitions, and 20 cm high slabs in prefabricated reinforced concrete panels. The structural typology of the flat roof is similar to that of the intermediate slabs.

Both the eastern and western blocks are divided and marked longitudinally by seven 18 cm thick reinforced concrete transversal walls with two outer layers of Eraclit (mineralized wood wool panels) 2.5 cm thick on each side. These walls give a peculiar characterization to the structural conception of the building. The concrete partition walls divide the dwellings into repetitive mirrored patterns and become the primary vertical load-bearing structure as they support the main beams and all the internal stairs (Figure 4).

The inner structure of these partitions walls is not homogeneous: they are generally weakly reinforced, but heavier reinforced vertical and horizontal parts are present on the inside. These parts make up an internal beam and pillar warp. Due to the horizontal offset of the half-story floors, the internal warp of the partitions is particularly dense. Each partition contains two pillars and two beams of different thicknesses both at the floor junction and above each walkaway overhang. The reversed beam foundations are made of reinforced concrete laid on piles (Figure 5).

The main stairwells are not rigidly connected to the main structure: each stairwell has a reinforced concrete bearing wall in the center of the flights, and all landing loads are supported by a corbel beam coming out of the floor slabs. The stairs foundations (except for the central one) are not connected to those of the building, but have their own reinforced concrete reversed beams; consequently, the differential settling of the ground caused the side stairs to sink, causing vertical subsidence of 2–3 cm compared to the building. Despite its considerable longitudinal length, the building has no seismic or expansion joints.

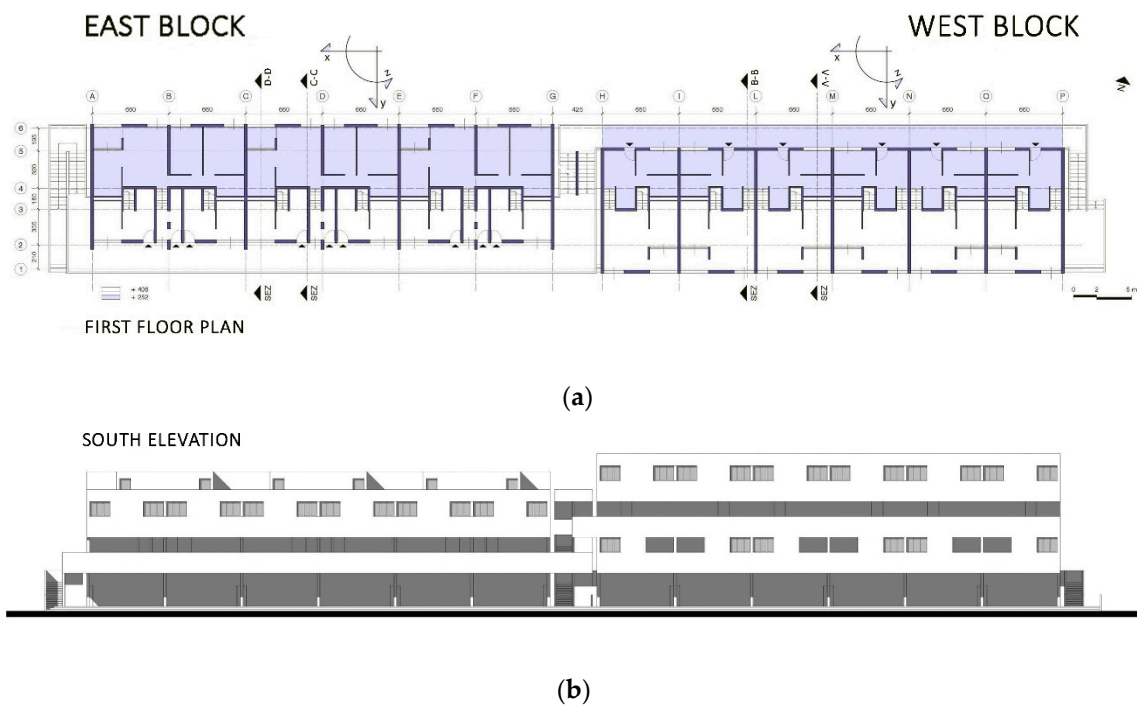


Figure 4. Planimetric and elevation design of the building. (a) First floor plan with main transversal bearing walls. (b) South elevation with longitudinal walkways connecting all the dwellings.

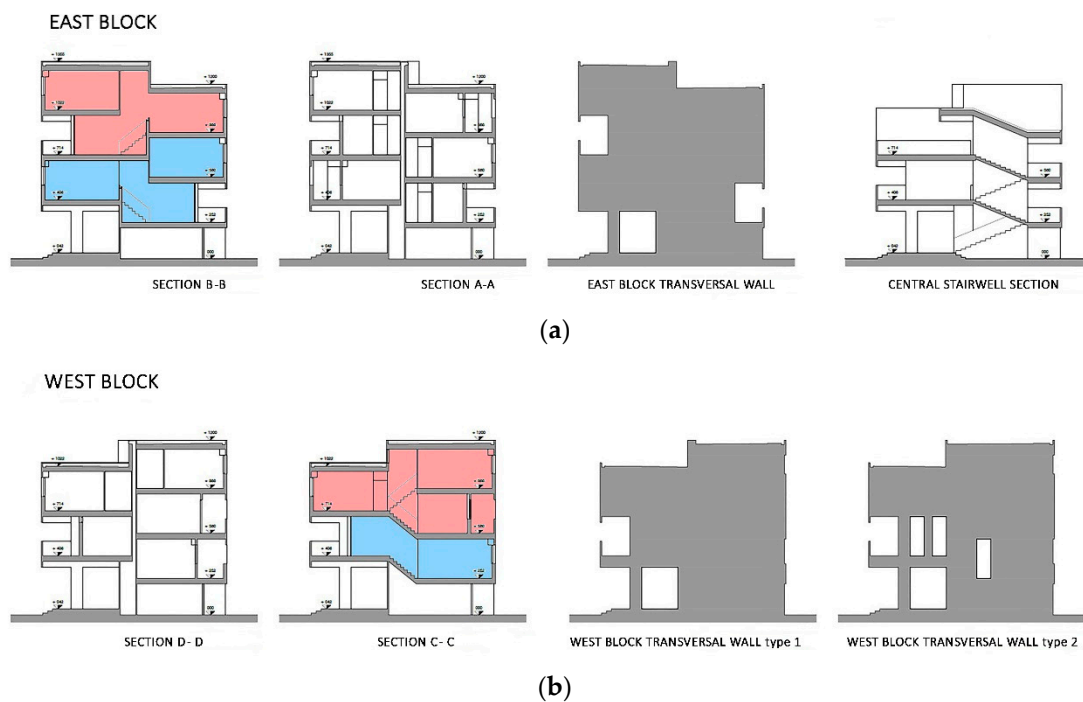


Figure 5. Structural design of the building. (a) East block sections and structural conception of the transversal bearing walls. (b) West block sections and structural conception of the transversal bearing walls.

The external walls along the north and south sides of the building have the following stratigraphy from the outside to the inside: 1 cm of plaster, 12 cm of bricks, 2 cm of rock wool, 8 cm of hollow bricks and 1 cm of plaster, for a total thickness of 24 cm.

The windows are placed only on the longest facades (the short sides are entirely blind), and the frames are still the original ones, made of single-glazed steel without thermal break. Some tenants have installed double aluminum frames on the outside to prevent rain infiltrations. On these elevations, all private balconies have been closed with double aluminum frames to gain more living space inside the dwellings. Additional aluminum frames were also installed on the end parts of the communal walkaways to limit the rainwater flooding. The heating system and the production of domestic hot water are centralized on the ground floor, where the boiler room is located, and a diesel generator is installed. Many dwellings have an individual air conditioning system for summer cooling. Only one apartment in the western block was weakly insulated with a 4 cm thick external coat on the northern facade.

2.3.3. Maintenance Status

The building is in poor maintenance status due to the original construction imperfections, typical of years of construction, and lack of maintenance over time. The design criteria of the building, although very fashionable at the time of its construction, suggest that it was a “clumsy” repetition of a type of construction that had great charm at the time. Some residents who attended the construction site claim that the design of the building was not well defined and that its construction was poorly managed and controlled. The building was certainly designed in a short-sighted way, without considering the aging of generations, the elderly, and the disabled, and future changes in lifestyles. Beyond the possible reasons for the current situation is the fact that the occupants face these problems in their daily lives.

At first sight and even after the inspection, several technical shortcomings of the building can be reported. In addition to insufficient insulation, or rather none at all, the low drainage capacity of the roof and the formation of moisture patches in the most exposed walls have often been pointed out. The flat roof, protected only by a thin bituminous coating, has a compluvium that leads from the facades to the center of the building and drains in an open longitudinal inner cavity from the roof to the ground. As a result, the apartments have considerable rainwater infiltration problems on the upper floors: stains in the ceiling, blooming in the plaster, or moisture penetration (Figure 6).



Figure 6. Maintenance status of the building (a) Rainwater infiltration problems causing blooming in the plaster. (b) Moisture patches in the most exposed walls.

Another typical problem, due to the dwellings' specific internal layout on scattered floors, is related to cooling and heating. The internal stairwells, in fact, act as air convectors and make it difficult to maintain an optimal temperature in both winter and summer. Frequent complaints concern the northern windowed facade, which in the cold seasons is often affected by heavy rain that causes water infiltration and internal temperature lowering. On the contrary, the southern front is barely livable in summer due to a considerable heat accumulation caused by the lack of shading elements. In addition, the original steel window frames, due to the building displacements over time and amplified by their slimness, display considerable air currents. All things considered, together with the walls' poor stratigraphy and the entrance doors made only of honeycomb sandwich wood, the level of insulation of the apartments is not adequate for current energy-saving standards (Figure 7).

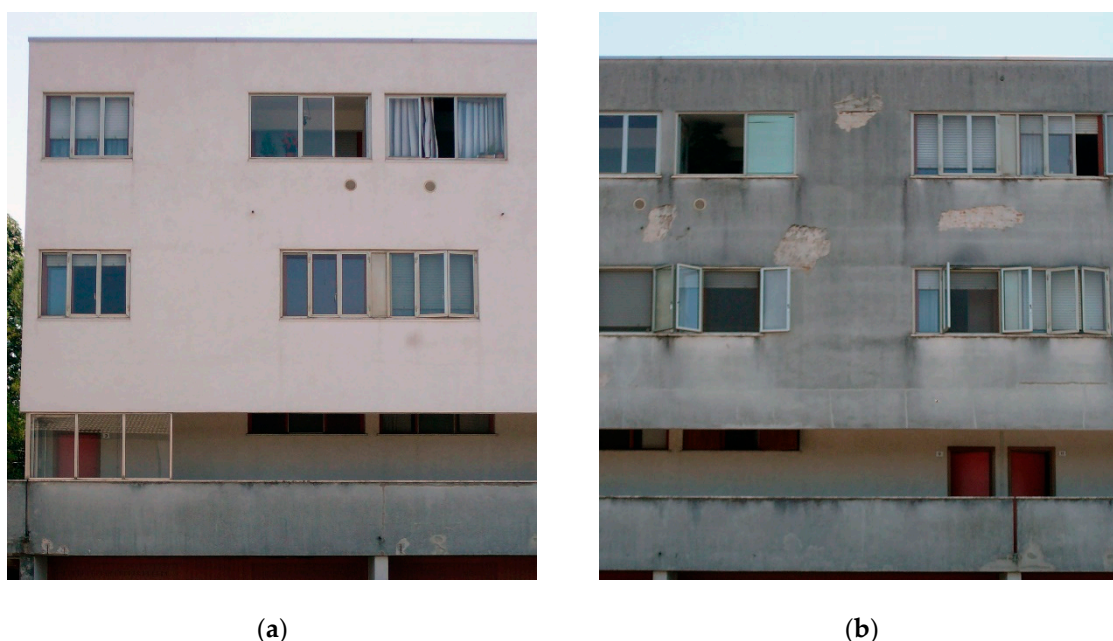


Figure 7. Maintenance status of the building (a) Small part of the northern facade where the external insulating cladding has been installed. (b) Original facade cladding with plaster detachments.

The maintenance status of the facades is not particularly good, and often damage and detachments occur. In particular, there is detachment of plaster pieces on the north elevation, which is more exposed to adverse winter weather conditions, and also the dislodgement of the concrete covering both in the stairwell walls and the corners of the walkaway beams. Evident cracks are visible in the connection where the concrete beams support the outer infill walls. Where rebars emerge at sight, they cause the inhabitants some concern which, although excessive, is not entirely unfounded in inexperienced people. An elevator system does not serve the building, and also the presence of internal stairs in the apartments does not facilitate movements for disabled people (Figure 8).

For these reasons, ATER has scheduled for this building a retrofitting project promoted in collaboration with the Veneto Region, aimed at improving its energy performance. The project consists of several interventions aimed at reducing or removing the main critical issues from the energy point of view:

- Thermal insulation (12 cm fiberglass panels) of the whole external building envelope, including the roof and intrados of garages and portico;
- Replacement of windows and doors and installation of a new heat generation system. The new system uses natural gas instead of diesel oil as fuel and is integrated with renewable energy sources.
- At the same time, during the energy retrofitting intervention, some actions will be taken to improve the seismic performance of the building;

- In the outermost parts of the two blocks, the thermal insulation will be stiffened with the inside filling of a 12 cm thick reinforced concrete panel, divided into two—an 8 cm external layer and a 4 cm internal one;
- Installation of an eccentric bracing system along the longitudinal axis of the building in order to bear the seismic reinforcement coating and transfer the horizontal thrusts to the ground;
- Transversal walls strengthening by reinforced concrete diaphragm construction. These diaphragms will be built between the foundations and the first floor, at the garage level on the northern facade, to act as an effective structural reinforcement and completion for the transversal load-bearing walls.



Figure 8. Maintenance status of the building. (a) Concrete cover detachments in the walkaway beams. (b) Concrete cover detachments in partition walls.

2.4. Ethnographic Research on Inhabitants

The main ethnographic research results are presented below. The study consisted of semi-structured interviews with demo case residents and some ATER managers and technicians involved in the renovation project. The semi-structured interviews are essentially conversations on a specific topic or field of interest. The researcher asks questions and tries to convey the sub-topics she/he wants to discuss in the conversation. In this manner, researchers can steer the interview in the desired direction. Questions with sharp answers and quick changes in the (sub-)topics under discussion are usually avoided to let the interviewee feel comfortable.

Experienced informants were asked to talk about their experience in the field of energy renovation of buildings. The topics covered in the conversation were related to their specific field but also the studied building. The discussion was mainly focused on issues related to renovation project problems and their possible solutions.

Non-experts were asked to talk about their lifestyle and daily habits. The analysis mainly focused on which are the recurring characteristics of the different dwellings in terms of internal comfort and energy performance. The analysis also focused on how people perceive their internal environment and what strategies and practices they have developed trying to regulate it. The individual interviews were also followed by an observation period and “sensory ethnography” [27] in which residents were studied during their daily lives while capturing their habits through photos and images. In addition to the individual interviews, a “focus group” was planned. The group discussion was attended both by expert interviewees and residents in order to compare different points of view and mutual experiences.

During the interviews, the interviewees often referred to a nearby building in the city of Portogruaro, recently renovated, that seems to be, for all residents, a notable example in terms of beauty, functionality, and comfort. This building is also owned by ATER Venice and was renovated in 2013 with funding from the “European Regional Development Fund”.

2.4.1. Summary Interviewee Opinion Report

The specific position within the building significantly determines the wellbeing characteristics of each apartment. The key factors are the orientation to the sun, the external wall areas, and the exposure to main pollution sources (noise, smell, light). The interviews showed that factors such as aesthetics and construction defects are also relevant. In general, all the interviewees seemed dissatisfied with the internal wellbeing characteristics of their apartment and the general maintenance status of the whole building. Although they were not involved in the activation of the renovation process, decided upstream by the management company, they are generally in favor of a deep energy renovation with the idea of achieving better indoor wellbeing (especially concerning thermal comfort) and the potential for long-term economic savings.

All dwellings have windowed facades both to north and south, and this generates opposite problems. On the north side, the most difficult situations occur during winter when frequent water and air infiltrations affect the poor window sealing. The south side, on the other hand, is almost unlivable in the summer months and causes heat accumulation inside the apartments.

The apartments' shapes on several levels is a problem both from the energy point of view, creating a strong chimney effect that makes it difficult to heat them uniformly and for the livability for the elderly or those who have mobility impairments. The location within a park and the opportunity to enjoy a pleasant public greenery view are instead perceived as positive characteristics, and given the building layout, are shared by all dwellings.

Electricity and heating costs are generally considered too high. This is deemed to be because of external walls' low efficiency and the centralized oil boiler's low performance. Communal costs are not divided according to each resident's real energy consumption but equally divided by the number of occupants. The presence of defaulting tenants or vacant apartments also contributes to an increase in the annual fee for each paying resident. The general maintenance of shared spaces is generally perceived as inadequate, and in some cases, safety concerns have been expressed.

Few tenants have carried out minor maintenance work on their own to improve comfort and wellbeing. Some of them have been able to minimize the chimney effect of the internal stairs by isolating the top. Some have tried to increase radiator efficiency by reducing energy dispersions or improving window tightness. In only one apartment, more significant interventions were made, such as the adoption of an internal thermal coat, at the cost of losing part of the living space. The installation, although partial, of an outer thermal coat, has contributed to improving the internal conditions of the apartments concerned (Figure 7). The rest of the dwellers, not involved in this partial renovation, started to look forward to intervening on the wall performance to reduce energy consumption.

The main key factor for the renovating phase acceptance seems to be the introduction of separate utility accounts, foreseen in the project, which would keep relations between residents less conflicting. Another critical element to make the renovation project acceptable is emulation. As mentioned above, many residents are attracted by a nearby recently renovated building in Portogruaro. The mere knowing, by hearsay, that the renovation in that building raised the indoor wellbeing and lowered the expenses helps the demo case residents becoming less skeptical about the renovation process.

As far as the renovation of the facade is concerned, the scenario of improving thermal comfort is, by far, the most crucial aspect mentioned by the interviewees. The renovation of the energy production system and the improvement of window and door tightness is perceived as essential to achieving acceptable internal wellbeing and, at the same time, containing costs. None of the interviewees complained about noise, and given the quiet building location, the outside noise problem is almost irrelevant. Almost all of them, instead, complained about the walls and floors weak sound insulation, highlighting disturbances coming from adjacent apartments that contribute to the tightening of neighborly relations.

Interviewees described their apartment air quality ambiguously. In general, tenants complaining about the air quality were those who found more moisture and mold formation due to water infiltration from the northern facade. Complaints about the poor lighting in the apartment were only made

by tenants living in one-story dwellings in the western block. In general, lighting standards are considered good.

Although not directly relevant in terms of thermo–hygrometric wellbeing, aesthetic aspects are essential to living well in a building. The expectation of improving the appearance of the building is, therefore, a strong incentive for tenants.

2.4.2. The Questionnaire

Additional quantitative research was also conducted at the European level in all countries involved in the TripleA-reno project. In order to compare the results obtained on the national case studies with a broader database, a questionnaire (the English version of the questionnaire is available in Supplementary Materials) was developed to collect more data on occupants and households.

Special attention was put on the TripleA-Reno case studies in different countries where study participants are also further involved in deeper ethnographic studies (Slovenia, Italy, Greece, Hungary, The Netherlands, Spain). The result from the questionnaire add to the applied ethnography interesting information on the composition of the research sample, the buildings or dwellings current status, degree of satisfaction about IEQ (Indoor Environmental Quality) or wellbeing, energy-related habits, costs for heating and cooling, and personal decision factors are main barriers for renovation [28].

In order to make the questionnaire as useful as possible for all actors involved, such as overcoming language barriers, a double translation process was used in which consortium partners translated the English version into their national language for the first time and then vice versa, from the translated version into English to check the harmonization level.

The Italian questionnaire dissemination was made through paper forms, which were delivered directly to households, and through a web platform [29]. The questionnaires, anonymous and GDPR compliant, were disseminated through the websites of all the Italian social housing management companies involved in the project (ATER Venice, ACER Reggio Emilia, and ACER Bologna) and were also delivered in paper form to the different case study buildings.

The activities carried out allowed for obtaining a large amount of statistical information (the minimum objective was to collect at least 150+ questionnaires for each country involved) that could be analyzed and aggregated to determine the more evident key factors at different scales: European, Italian and local.

The first evidence emerged from the questionnaire concerns the age and educational level of the tenants living in the Concordia building compared to the national and European average. In fact, almost all the interviewees (93%) were over 60 years of age, while the figure obtained from the national questionnaire was almost a third (30%). Any interviewed tenants had a university or higher education while at the national level, the figure is more distributed among all grades of school education. The gender distribution, on the other hand, is perfectly in line with the national average. Female respondents are usually more than male (60%). Usually, the families living in Italy, and particularly in the demo-case, are composed of old couples with grown-up children (more than 50%). This is quite typical in all European countries involved in the survey. Due to the specificities of the Italian social housing system, while in all other European countries, most of the dwellers are also owners (80% average); in Italy, almost 60% of residents are tenants. This figure increases in Concordia's demo-case in which 100% of inhabitants are tenants.

The percentage of respondents who consider their home to be a healthy environment is meager (20%), while data on a national basis indicate a slight prevalence of those who consider their home very livable (53%). The data on energy expenses are also significant. The national data clearly represent the fact that more than 2/3 of the answers (69%) indicate high energy costs. The figure for the Concordia multiapartment building increases to almost all respondents (93%), which shows that this is one of the most burning issues.

Looking at the comparative tables showing the tenants' degrees of satisfaction in their own homes, it is evident that, for all the survey topics, the degree of satisfaction is not exceptionally high. European

average value shows that inhabitants feel more satisfied with the dwellings' internal conditions than with the overall conditions of the building. This trend is also confirmed at the national level, although with a lower satisfaction degree, even if the figure seems to be reversed for the specific case study. The tenants are substantially very dissatisfied with the condition of the whole building (Table 1) while they show a more significant (though not high) consideration for the living conditions of their dwellings (Table 2).

Table 1. Satisfaction degree concerning the entire building issues.

Legend	4.1 ≤ x ≤ 5.0		Very Satisfied					
	3.1 ≤ x ≤ 4.0		Satisfied					
	0.0 ≤ x ≤ 3.0		Not Satisfied					
Satisfaction Degree	Noise Levels	Aesthetics	Sense of Security	Maintenance	Environment	Accessibility	Energy Efficiency	Other
EU	3.3	3.3	3.6	3.4	3.0	2.4	2.8	/
ITALY	3.1	2.6	2.7	2.5	2.5	2.1	2.1	2.7
CONCORDIA	1.9	1.2	1.5	1.8	2.2	1.3	1.5	2.0

Table 2. Satisfaction degree concerning single dwelling issues.

Legend	4.1 ≤ x ≤ 5.0		Very Satisfied					
	3.1 ≤ x ≤ 4.0		Satisfied					
	0.0 ≤ x ≤ 3.0		Not Satisfied					
Satisfaction Degree	Natural Illumination	Artificial Illumination	Noise	Air Quality	Humidity	Temperature	Other	
EU	4.1	3.8	3.5	3.6	3.4	3.5	/	
ITALY	3.6	3.5	3.2	3.0	2.7	2.5	2.0	
CONCORDIA	3.0	3.3	1.8	2.5	1.5	1.5	2.0	

3. Data Analysis and Comparison

The ethnographic research carried out in Concordia Sagittaria, in addition to highlighting and interpreting the key results connected with energy performance and comfort, has been useful to identify the extent to which the fundamental concepts of the TripleA-reno project can be activated in terms of accessibility, attractiveness, and acceptability of energy requalification. The results could also be compared with statistical data gathered with the specific questionnaire developed within the project activities.

The Project Keywords: Attractive, Affordable and Acceptable

One of the main objectives of the TripleA-reno project is to analyze what makes renovation projects attractive, affordable and acceptable for individual owners and other stakeholders.

Most residents find investments in renovation projects attractive for their long-term savings expectations. In the demo case, since all inhabitants are tenants, the financial commitment of the works is not upon them, but on ATER Venice. This condition makes the renovation project obviously a saving factor for the tenants who would have an immediate advantage in the current expense for the management of utilities. The economic advantage for the management company, on the other hand, is not immediate but has to be foreseen mainly in terms of maintaining the property market value and lowering future maintenance costs. In the specific case of this building, state financial subsidies played a crucial role in the renovation process activation. Affordability is often evaluated from an economic perspective. It seems to be one of the critical aspects of energy renovation projects: affordability for the tenants of Concordia Sagittaria is not a deciding factor, as the costs are all borne by the management company. In this specific case, the managers and designers could implement a project that combines the characteristics of energy renovation with those of seismic improvement to access particularly advantageous state funding in order to make the intervention sustainable and, therefore, affordable.

People are interested in renovations to improve the external appearance of their buildings. This behavior could also be bound to a function of public recognition and compliance with social

standards. In the demo case in Via Julia, the comparison with other recently renovated buildings in the area makes the expectation for renovation very attractive.

Although most residents, during the interviews, also mentioned environmental values and principles as an incentive to support the renovation, this seemed a secondary motivation, which comes after the financial and aesthetic perspectives. Perhaps this trend is motivated by recent media clamors about climate change. Indeed, the aspects related to the improvement of IEQ aspects—thermal comfort, noise, air quality, and light—are the crucial ones. This is particularly true for people who have had severe problems with humidity and efflorescence on plaster in their dwellings.

Analyzing data collected from the questionnaires at the different levels of the survey (European, national, and local), it is possible to compare the importance degree (Table 3) of the different aspects related to the key factors. The primary outcome is that there is substantial consistency concerning the economic and wellbeing aspects. In contrast, the aspects related to the increase in the property market value are particularly insignificant in the case study building because the interviewees were all tenants and would not benefit from it.

Table 3. Importance degree of the deciding elements considered for undertaking the renovation process.

Legend	4.1 ≤ x ≤ 5.0		Very Important				
	3.1 ≤ x ≤ 4.0		Important				
	0.0 ≤ x ≤ 3.0		Not Important				
Importance Degree	IEQ Improvement	Energy Savings	Environmental Aspects	Property Market Value	Aesthetics Improvement	Other	
EU	4.3	4.3	3.8	3.5	3.6	/	
ITALY	4.3	4.0	3.5	2.9	3.1	3.1	
CONCORDIA	4.5	4.8	4.5	2.2	4.1	4.0	

The negative aspects associated with energy renovations must also be taken into account. Technical obstacles are an important deterrent, highlighted in the interviews but not considered in the questionnaires. It emerged that there is, in general, a certain dissatisfaction with ATER Venezia, and this is reflected in the lack of confidence that the renovation will eventually take place. Another factor why renovation projects are unattractive is the disruption of daily life. Having to live with a renovation building site forces people to change their daily routine considerably and to endure various inconveniences, sometimes for long periods, such as unwanted but inevitable noise and dirt.

The concept of acceptability cannot always be translated into financial terms. For tenants, in this case, the dwellings living conditions and the entire building aesthetics improvements are significant in the perspective of a sort of “revenge” against the other inhabitants of the city that will start to hold them in higher regard.

Acceptability is the real turning point in the decision-making process. It is likely to trigger issues at one or more points of its implementation if a solution or project is not satisfactory to all parties concerned. A renovation would be acceptable to all parties involved by bringing together the factors summarized in the previous points if they recognize that it is worth spending time, effort, and money. Tenants are more likely to support the project if they are assured that at least one of the two main factors—financial savings or enhanced quality of life—would deliver a good return. The latter involves enhancing the IEQ, aesthetic aspects, and social acceptance, among others. When they are well educated about the crucial aspects of the project—technological, financial, and realistic—people are more likely to find renovation projects appropriate. In a situation where most residents were involved (the focus group), the straightforward presentation of the leading project issues successfully contributed to making the renovation viewpoint more appropriate.

The relationship of trust with the management company that will have to make decisions on the project and the companies that will have to implement it is undoubtedly a decisive factor in making a project acceptable. Additionally, fundamental is the guarantee that the works will not exceed certain limits, deadlines, and budgets. The higher this confidence, the easier it will be to make the process acceptable. From this point of view, the promotion and enhancement of projects that have already

been successfully implemented in the area can contribute significantly to increasing the management company's reliability. Tenants are more likely to support renovating if the solutions are simple, truly effective, and efficient even for non-experts.

4. Conclusions

The first consideration that arises is that knowing that people and their actions, attitudes, beliefs, motivational factors, and relationships with others are an essential part of the broader field of energy renovation. The scope of the problem involves an interdisciplinary approach to understand and shape human relationships with energy systems. Characterizing the profiles of the occupants is, therefore, a prerequisite for both a technical approach to individual projects and for overcoming the resistance that tenants usually object to regarding changes in their behaviors and lifestyles.

From this viewpoint, the user-centered ethnographic approach of the TripleA-Reno project aims to enhance the understanding of different aspects of human experience and social processes in their complexity in "actual" contexts. It provides a tool for an in-depth study of people and different human factors (e.g., attitudes, motivation, values) that affect decision-making and (un)willingness to undertake expensive and challenging energy upgrades for residential buildings. In addition, this approach helps discover and explain the relationship between the technical aspects of renovation projects, which are of fundamental importance to technicians and organizations, and the relationship they have with the experience of the people who are the main subjects of these projects.

The approach adopted is useful in bringing forward a range of suggestions for enhancing deep energy renovation processes in order to achieve a higher range of interventions and greater quality. One of the main goals of the TripleA-Reno project is to give building occupants full awareness and customized knowledge on energy usage, the indoor environment, health, and lifestyle. All of this with the goal of enhancing the energy renovation of the current European building stock.

The Italian demo-case experience, even if confined to a small building, indicates a high potential for the replication of the entire Italian social housing stock. Many of the buildings run by social housing companies are relatively close to the Concordia situation. This is valid both in terms of building and technical systems and the widespread lack of maintenance. In addition, the profile of tenants is very similar, as they are usually elderly singles or couples. Lastly, the state of becoming tenants and not owners is characteristic of the Italian background and has no parallel in the other European countries concerned.

Italian results demonstrate that the decision-making process in multi-apartment buildings is complex, and it is challenging to reach consensus among all involved stakeholders:

- Community buildings is one of the first results, since the involvement of a cooperative community manager is a bridge between all stakeholders in even to coordinate all the preparatory activities.
- The building of people's trust is the secret to the success of the renovation project. Renovations are satisfactory if all parties involved are informed that their time, effort, and financial commitment will be worth it.
- Examples of similar successful initiatives with a positive impact should be displayed, preferably coming from the surroundings.
- The winning policy minimizes the effect on the everyday life of the inhabitants. The project should be clearly divided into phases so that people can easily track progress from phase to phase (and obtain feedback).
- Finally, it is essential to evaluate and consider the wider context since it is one of the critical determinants of energy behavior and social change. The disruption created by the refurbishment of the building could provide an ideal momentum to promote new behavioral and social change.

TripleA-Reno's point of view focuses on people's view of the indoor environment and their attitude towards the renovation of buildings (affordability, attractiveness, acceptability), based on the crucial premise that it is people who use energy instead of buildings. This does not mean that the use of

resources is an exclusive function of individuals. It is clear that materials and technologies significantly affect overall energy usage and may depend on unique patterns of energy use. However, socio-cultural influences and variables are the keys to understanding rather than materials and technologies.

In addition, views that transcend the individual need to be considered—ties between building users and the local broader community, hierarchies of information and control, ownership concerns, relevant regulations, potential illegal business and management practices (corruption), socio-cultural norms and/or restrictions, etc. In order to better grasp people's attitudes towards buildings and the reconstruction of buildings, the entire context becomes fundamental.

For this reason, the research group has adopted an applied ethnography approach in a variety of other demonstration cases across Europe. These case studies vary with respect to building and urban typology, home layout, geography, and other unique characteristics. It will, therefore, be necessary to compare the qualitative findings of the ethnographic research with the relatively large-scale quantitative statistical studies. The goal is to evaluate and understand the results and to provide clear recommendations to TripleA-reno Gamified Platform Developers. The profiling of end-users (tenants, professionals, administrators, technicians) will help build more tailored tools to facilitate the onboarding of end-users. The more end-users that are involved, the more they can impact the co-creation of the most productive energy renovation solutions through a participatory process.

Supplementary Materials: A video description and virtual tour of the building are available at the following link: https://drive.google.com/file/d/1mqEYiniZ6x3g7-579iAhFj4_H1U2UJdz/view?usp=sharing. The English version of the questionnaire is available at the following link: https://drive.google.com/file/d/1lu-mSBHqgPPeUwiCBzGuWU_ha6eg0ZaN/view?usp=sharing. Data gathered and pre-elaborated from the questionnaire at European and National level are available at: <https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5c64ecbcb&appId=PPGMS>.

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