Attractive, Acceptable and Affordable deep Renovation by a consumer orientated and performance evidence-based approach
Contract No.: 784972

Report: D2.2 Inventory of user groups
Work Package: WP2 – Task 2.2
Deliverable: D 2.2
Status: public

Prepared for:
European Commission
EASME
Project Advisor: Rebecca Kanellea

Prepared by:
IRI UL: Gregor Cerinšek

Contributors:
IRI UL: Domen Bančič, Jure Vetršek, Dan Podjed, Sara Arko
HIA: Simona D’Oca
COM: Gabor Nemeth
UNIBO: Davide Prati
IVE: Ana Sanchis, Miriam Navarro
HE: Sebastien Garnier
UIPI: Spyridon Pantelis
### Revision and history chart:

<table>
<thead>
<tr>
<th>VERSION</th>
<th>DATE</th>
<th>EDITORS</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version 0.1</td>
<td>2019-04-01</td>
<td>IRI UL</td>
<td>First outline draft provided</td>
</tr>
<tr>
<td>Version 0.2</td>
<td>2019-04-15</td>
<td>HIA, COM, UNIBO, IVE, UIPI</td>
<td>Contributions received and integrated</td>
</tr>
<tr>
<td>Version 0.3</td>
<td>2019-06-29</td>
<td>HIA, COM, UNIBO, IVE, UIPI, HE</td>
<td>Second round of contributions received and integrated</td>
</tr>
<tr>
<td>Version 0.4</td>
<td>2019-07-29</td>
<td>UIPI, IVE, HE</td>
<td>Modifications of user profiles</td>
</tr>
<tr>
<td>Version 0.4</td>
<td>2019-07-31</td>
<td>IRI UL</td>
<td>Final version submitted to coordinator</td>
</tr>
</tbody>
</table>
Table of contents

Executive summary.................................................................................................................. 8

1 Introduction .......................................................................................................................... 10

1.1 Challenge .......................................................................................................................... 10

1.2 TripleA-Reno Interdisciplinary People-centred Approach .................................................. 11

2 Personas ................................................................................................................................ 14

2.1 Analysis ............................................................................................................................... 15

2.1.1 Greece ............................................................................................................................. 16

2.1.2 Spain ............................................................................................................................... 16

2.1.3 Hungary ......................................................................................................................... 17

2.1.4 Romania ......................................................................................................................... 17

2.1.5 Italy .................................................................................................................................. 17

2.1.6 The Netherlands ............................................................................................................ 18

2.2 Case Specific Findings ...................................................................................................... 18

2.3 General Findings ............................................................................................................... 20

2.4 Recommendations future research ................................................................................... 22

3 TripleA-Reno WP2 Questionnaire ....................................................................................... 24

3.1 Research Sample ............................................................................................................... 25

3.1.1 Country of residence: ................................................................................................. 25

3.1.2 Sex: ............................................................................................................................... 25

3.1.3 Achieved education: .................................................................................................... 26

3.1.4 Number of people in the household: .......................................................................... 26

3.1.5 Children below 10 years: ............................................................................................ 26

3.1.6 Ownership status: ....................................................................................................... 27

3.1.7 Building age: ................................................................................................................ 27

3.2 Renovation ........................................................................................................................ 28

3.2.1 Is your building/flat currently in the process of renovation? ......................................... 28

3.2.2 If yes, what precisely is being renovated? ................................................................... 29

3.2.3 Who initiated the renovation process of your building? ................................................ 31

3.3 Personal key decision factors in favour of renovation ...................................................... 32

3.3.1 Financial savings ........................................................................................................ 32

3.3.2 Improving aesthetic ..................................................................................................... 33
3.3.3 Improving health, wellbeing ................................................................. 34
3.3.4 Increased value of the property .......................................................... 34
3.3.5 Environment ......................................................................................... 35
3.4 Main barriers against renovation .......................................................... 37
3.4.1 Achieving common and jointly agreed decisions .................................. 37
3.4.2 Legal barriers ...................................................................................... 37
3.4.3 Costs .................................................................................................... 38
3.5 Satisfaction .............................................................................................. 40
3.5.1 Home as a healthy environment .......................................................... 40
3.5.2 Satisfaction regarding different aspects in home – temperature .......... 40
3.5.3 Satisfaction regarding different aspects in home – air quality .......... 41
3.5.4 Satisfaction regarding different aspects in home – natural illumination .... 42
3.5.5 Satisfaction regarding different aspects in home – artificial illumination .... 42
3.5.6 Satisfaction regarding different aspects in home – humidity ............... 43
3.5.7 Satisfaction regarding different aspects in home – noise ...................... 43
3.5.8 Satisfaction regarding different aspects in building – attractiveness and aesthetics ...... 45
3.5.9 Satisfaction regarding different aspects in building – clean and well-maintained ...... 45
3.5.10 Satisfaction regarding different aspects in building – sense of security ...... 46
3.5.11 Satisfaction regarding different aspects in building – accessibility .......... 47
3.5.12 Satisfaction regarding different aspects in building – energy efficient ...... 47
3.5.13 Satisfaction regarding different aspects in building – environmentally friendly ...... 48
3.5.14 Satisfaction regarding different aspects in building – noise levels ......... 48
3.6 Habits, usage of personal devices and equipment .................................... 51
3.6.1 Use of heater ...................................................................................... 51
3.6.2 Use of fan ............................................................................................ 51
3.6.3 Use of humidity control devices ......................................................... 52
3.6.4 Use of plug-in lamps ......................................................................... 53
3.6.5 Change of clothing ............................................................................. 53
3.7 Costs for electricity and heating ............................................................. 55
3.8 Informed about energy savings ............................................................... 55
4 TripleA-reno List of Topics ........................................................................ 57
4.1 The contexts ............................................................................................ 57
### Tables / Figures

| Figure 1: | Task 2.2 and Task 2.3/2.4. integrated into the People-centered design & development approach | 8 |
| Figure 2: | 4 steps of the People-centred design and development approach | 12 |
| Figure 3: | Pictures from the persona’s workshop | 15 |
| Table 1: | Number of personas developed per case study / country | 16 |
| Table 2: | Number of personas with low / middle / high income | 18 |
| Table 3: | Likes and dislikes about the building and environment per case study / country | 19 |
| Table 4: | Motivations and barriers for renovation per case study / country | 19 |
| Table 5: | Positive and negative considerations in relation to the building and environment | 20 |
| Table 6: | Motivations and barriers in relation to renovation | 20 |
| Table 7: | Country of residence | 25 |
| Table 8: | Comparison among country samples | 28 |
| Table 9: | Comparison among country samples – renovation on a building and individual apartment levels | 31 |
| Table 10: | Who initiated the renovation process of your building? | 31 |
| Table 11: | Comparison among country samples – personal key decision factors in favour of renovation (1) | 36 |
| Table 12: | Comparison among country samples – personal key decision factors in favour of renovation (2) | 36 |
| Table 13: | Main barriers against renovation – Achieving common and jointly agreed decisions | 37 |
| Table 14: | Main barriers against renovation – Legal barriers | 38 |
| Table 15: | Main barriers against renovation – Costs | 38 |
| Table 16: | Comparison among country samples - main barriers against renovation (1) | 39 |
| Table 17: | Comparison among country samples - main barriers against renovation (2) | 39 |
| Figure 1: | Would you consider your home a healthy environment in this moment? | 40 |
| Figure 2: | How satisfied are you over the following aspects in your home – temperature | 41 |
| Figure 3: | How satisfied are you over the following aspects in your home – air quality | 41 |
Figure 27: How satisfied are you over the following aspects in your home – natural illumination

Figure 28: How satisfied are you over the following aspects in your home – artificial illumination

Figure 29: How satisfied are you over the following aspects in your home – humidity

Figure 30: How satisfied are you over the following aspects in your home – noise

Table 15: Comparison among country samples – satisfaction over different aspects in home (1)

Table 16: Comparison among country samples - satisfaction over different aspects in home (2)

Figure 31: How satisfied are you over the following aspects of your building – attractiveness and aesthetics

Figure 32: How satisfied are you over the following aspects of your building – clean and well-maintained

Figure 33: How satisfied are you over the following aspects of your building – sense of security

Figure 34: How satisfied are you over the following aspects of your building – accessibility

Figure 35: How satisfied are you over the following aspects of your building – energy efficient

Figure 36: How satisfied are you over the following aspects of your building – environmentally friendly

Table 17: Comparison among country samples – satisfaction over different aspects in building (1)

Table 18: Comparison among country samples - satisfaction over different aspects in building (2)

Table 19: Comparison among country samples - satisfaction over different aspects in home and building

Figure 37: Use of heater

Figure 38: Use of fan

Figure 39: Use of humidity control devices

Figure 40: Use of plug-in lamps

Figure 41: Change of clothing

Table 20: Comparison among country samples – habits, usage of personal devices and equipment (1)

Figure 42: How do you consider your cost for electricity and heating?

Figure 43: Are you informed about the energy savings?

Figure 44: Photos from the storytelling workshop
Executive summary

Key aim of the Deliverable 2.2 is to demonstrate the results of the Task 2.2 (Defining user groups) of the TripleA-Reno Work Package 2, and also to some extent combining them with preliminary findings from deep ethnographic studies carried out in Task 2.3 and Task 2.4 (Understanding habits, practices and motivations).

The overarching study approach is based on the 4 steps of the People-centred development approach focusing on the core idea that understanding people should become an indispensable part of industrial development processes, as a means to achieve new categories of products, services, or business strategies that truly address people’s needs and lead to sustainable innovation. As demonstrated in Figure 1 the goal of the Task 2.2 is the identification of the key target stakeholders as potential future users of our solution – representing the first step in the overall people-centred development process.

**Figure 1: Task 2.2 and Task 2.3/2.4, integrated into the People-centered design & development approach**

Therefore, the respective Deliverable 2.2 aims to touch on and demonstrate the relevance and diversity of typical occupants and furthermore tries to categorize them in a generic way into several user profiles. The deliverable is structured in 7 parts:

1. **Introduction** – exposing the basic challenge and illustrating the TripleA-Reno interdisciplinary People-centered approach which aims to address the challenge in hand;
2. **Personas** – demonstrating the approach we used to enhance understanding of the diversity and of typical occupants;
3. **Questionnaire** – presenting results from TripleA-reno quantitative research in different case studies;
4. **TripleA-reno List of Topics** – showing how the results from Task 2.2 influenced the development of topics and research questions for ethnographic studies;

---

1 For more information see the next, introductory part of this deliverable (Heading 1).
5. *User profiles and life stories* – summarizing the research findings and interpreting them in a form of typical user profiles and stories with some concrete recommendations for platform functionalities

6. *Conclusion and future work*

7. *Appendixes*
1 Introduction

As noted by several recent European policies in the field of energy efficiency, buildings are responsible for approximately 40% of energy consumption and 36% of CO2 emissions in the EU. In addition, almost 75% of the building stock is energy inefficient, while only 0.4-1.2% of the building stock is renovated each year. Logically, more renovation of existing buildings has the potential to lead to energy savings – potentially reducing the EU’s total energy consumption by 5-6% and lowering CO2 emissions by about 5%.

Improving the energy efficiency of buildings can also generate other economic, social and environmental benefits. Better performing buildings provide higher levels of comfort and wellbeing for their occupants, and improve health by reducing illnesses caused by a poor indoor climate. It also has a major impact on the affordability of housing and on the concept of energy poverty. Energy efficiency of buildings is also interlinked with social dimensions such as affordability and energy poverty. Investments in energy efficiency also stimulate the economy, in particular the construction industry, which generates about 9% of Europe’s GDP and directly accounts for 18 million direct jobs².

1.1 Challenge

The basic understanding that “buildings consume energy” (and not people who live or work in them) is still predominant in the energy efficiency discourse and is to some extent also obvious from previous paragraph (i.e. buildings are responsible for energy consumption). The concept of technical potential has been a fundamental tool for the energy efficiency industry and is based on engineering and economic calculations which are performed “without concern for the probability of successful implementation”. These prevailing approaches primarily focus on influencing the energy use by for instance increasing the efficiency of devices and structures and modifying and improving their technical characteristics. Economic criteria have served to justify and direct engineering change, under the assumption that cost-effectiveness is a suitable indicator of social good. A technical potential scenario assumes that the energy efficiency technologies under consideration are appropriate for all building configurations, infinitely available or below the cost considered, and have no economic, social, psychological risks that would dissuade consumers or organizations from adopting them.

As Janda⁴ explains, this kind of orientation does not put enough emphasis on people living or working in buildings and neglects the important effect of their actual behaviour, values, habits, motivation factors, and other practices connected to the energy use. The research has mostly focused on changing the behaviour of individuals with respect to devices and building envelopes, rather than considering social contexts, professional cultures, institutional expectations and technological landscapes that shape our activities, habits and practices. Within this arena of technical potential, humans enter implicitly as generating energy service needs and as economic agents who evaluate and purchase goods with respect to the cost-effectiveness of their future expected energy savings. In this sense people are not seen as creators of improved energy use, but rather as disturbing factors or barriers to such improvements since they are not able to understand what is in their best interest. The results have been a set of top-down views of people and energy that are ill-

---
equipped to recognize heterogeneity, social organization, or interests beyond energy and economic rationality\textsuperscript{5}.

There are several problems that occur. The models such as test protocols, building simulation models, program logic models and schema for behaviour change are isolated from broader context and can harbour assumptions about what people do. They are not based on actual observation and have very limited ability to incorporate variability of context\textsuperscript{4}. There is limited research aiming to enhance understanding of the socio-technical link as well as context-specific practices that influence human-building interaction\textsuperscript{6}. This furthermore limits the ability to identify and understand the key elements that can be used as behavioural and social levers to enhance retrofit efficacy. The designers make unrealistic assumptions about how people will actually behave as they do not capture their diversity, their behaviours, or their reasons for doing or not doing what they are “supposed” to do. In short, the approach does not leave much room for individual or social variability and for benefits and costs other than energy and money. Rather it focuses on replacing certain technical pieces by more efficient pieces, judging less or more efficient options within a relatively narrow band of consideration\textsuperscript{4}.

1.2 TripleA-Reno Interdisciplinary People-centred Approach

There is increasing recognition that technological solutions, economic/business arguments based on benefits and appropriate governance solutions are often insufficient to deliver the necessary change our society seeks for. The idealization embedded in technical potential scenarios are familiar, but they are not necessarily true, and the ability to compel people to act “properly” as seen from the perspective of narrow energy-centric models may be far more limited than can be imagined\textsuperscript{4}. The analysis of peer-reviewed energy-research literature carried out by Sovacool\textsuperscript{7} shows that the field of energy research is dominated by technical engineering and that interdisciplinary research also remains to some extent stymied by institutional barriers in academia and government.

However, it should be clear that we are not arguing against the importance of technical potential and its valuable contributions to the energy-efficiency field. Rather we aim to emphasize that a new interdisciplinary research is needed in order to understand how to maximise the opportunities that exist to improve the energy performance of the built environment. To understand how human behaviours affect energy demand and uptake of new technologies the “energy studies need social science”\textsuperscript{6}. The sociological, psychological and anthropological theories together with their research and analytical methods can provide measurable improvement in promoting energy conservation, which is affected by both behaviour and technology. The solution is not simply to include social science and humanities as an afterthought in a physical context, but rather as an “equal partner”\textsuperscript{5}. In the broader perspective the priority must be given to interdisciplinary research on energy consumption, which conveys the knowledge, methods, and metrics of building physics, economic, policy-making, and social science and humanities research altogether.

People-centred development originates from different disciplines and research practices of social sciences, namely industrial and design anthropology, user-centred and participatory design, applied and design ethnography and human-computer interaction. The overarching study approach used in the TripleA-Reno

\textsuperscript{5} M. Moezzi, K.B. Janda. From “if only” to “social potential” in schemes to reduce building energy use. Energy Research & Social Science, 1, pp. 30-40 (2014).


The concept of the people-centred development is based on the following premises:

- People should be involved in all development phases in order to create meaningful, relevant, useful, socially responsible, user-friendly, and sustainable solutions by generating new concepts and ideas, shaping products, forming services, testing prototypes or existing products and services. People are thus considered more than just “users”. Instead, they become active co-creators of solutions.

- The dialogue between engineers, developers, research, design teams, and people (potential users of new solutions) should be ongoing throughout the development process, including design. Research should be part of the creative process in product and service development, and not merely a problem-solving tool.

- Researchers with backgrounds in anthropology, sociology or psychology have the unique knowledge, methods, and skills for creating a link between industry and people, thus enabling and supporting the transition from users to active co-creators.

**Figure 2: 4 steps of the People-centred design and development approach**

With this picture in mind, the vision of the TripleA-Reno project is to promote widespread energy renovation of existing European housing stock and empower individuals and communities in favour of such developments. The first stage of the project aims to enhance understanding of different contexts and processes of energy renovation. To achieve this, several case studies are being implemented and studied in different EU member states. Since the focus of TripleA-Reno project is on the end-users (i.e. building...
occupants) and other stakeholders involved in the renovation activities, the quantitative and qualitative people-centred methods have been used to analyse and explain how specific contexts influence the processes in hand. The analysis and cross-comparison of results from different case studies portray the complexity of renovation processes by considering everyday realities, motivations, and issues faced by all actors involved in the renovation processes.
2 Personas

Personas are fictional characters which are created to represent the different user types that might use a certain product or service or, in case of TripleA-Reno project, could represent typical occupants/residents of certain building or house. The term is often used in development of IT solutions as part of the people-centred design, when several personas are usually made, and one is usually selected and remains in the focus of design and development processes (Lidwell, Holden & Butler 2010).

In addition to demonstrating the diversity of typical occupants and developing the user profiles we decided to implement the “PERSONAS approach” to inform different consortium partners about their own perceptions/assumptions about people (occupants/residents) and their specifics. It should be exposed that the fictional personas did not emerge from actual user research (as in the case of TripleA-Reno Task 2.3 ethnographic studies) but they emerged from the experience of the consortium team. It required the team to make assumptions based upon past interactions with the users/occupants base to deliver a picture of what, perhaps, typical users/occupants look like, together with their values, motivations & barriers, likes & dislikes related to deep energy renovation and energy habits.

Thus they were used as an initial sketch of users’/occupants’ needs. They allowed for early involvement with our users/occupants in the further TripleA-Reno design & development process, although they solely could not be considered as a guide for further development. Therefore, consortium participants were made aware that we are searching for artificial personas — average (and not real) representatives of households. We strated with the development of personas at the TripleA-Reno Kick-off meeting (Brussels, 13 June 2018) in a workshop settings (see photos below). Goal of this exercise was to obtain a general (preliminary) understanding of the end users’ for each case.

We decided to use a general template for preliminary personas identification for all case studies of the project (see Appendix 1: PERSONAS Template). Representatives of case studies have been focusing on their own context. Afterwards, a responsible person (“case holder”) who was from the site or was familiar with it, presented each case. The group which created personas gathered around the case holders. The participants got a task to create 2-3 typical users (occupants/residents) as they imagine them — from their personality and biography to physical characteristics. The process was moderated in order to receive comparable results from all groups. Some examples can be found in Appendix 2: Transcriptions of personas.

---

2.1 Analysis

In the respective section we attempt to generalize the results from the “Personas” workshop and provide recommendations for further investigation and development. Firstly, we present key findings from the perspective of specific country case and afterwards we present some general findings across different cases. Finally, we provide some suggestions for further ethnographic study in the context of the TrippleA-Reno Work Package 2 – Targeted information and communication to end-users.

In total, partners developed 15 individual personas, representing 6 different case studies/countires (see Table 1 together with Annex 1 and 2).
Table 1: Number of personas developed per case study / country.

<table>
<thead>
<tr>
<th>Personas per Country</th>
<th>Greece</th>
<th>Spain</th>
<th>Hungary</th>
<th>Romana</th>
<th>Italy</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL: 15</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

### 2.1.1 Greece

Typical representative of Greek case study is Ioana, female, age 22, who is a student of architecture and lives in a student dormitory. As a student she has relatively low income. She is quite introvert, very creative but quite passive in her life. She moved from a remote Greek island and her desire is to become a successful and famous architect. She experiences issues with the comfort of her building and apartment; it is hot during summer and cold during winters. As a student of architecture, she wants to improve the aesthetics of the building – the interior and exterior. She dislikes living in the respective community since overall quality of living is rather low. She dislikes the quality of the building, especially the noise, air quality and insulation. She does not care very much about energy and energy consumption. On declarative level she is open to technical improvements, in favour of smart buildings and homes. She uses energy during nights (mainly due to studying) and she shares the appliances with others in the building (washing machine, refrigerator).

### 2.1.2 Spain

First typical representative of Spanish case study is Juan, male, age 38 who works in creative industry as architect and designer. He has middle income, is very extrovert and creative, liberal and very active in his personal and professional life. He wants to pursue his professional career and enjoy in raising his 2 children. He had to close his consulting business and become regular employee in a company. Key motivation for renovation of the building derive from potential future savings and improving the overall aesthetics. Key barriers are related to legislation challenges. He likes the building; however, he dislikes relations with neighbours. He is very tidy and therefore consumes a lot of energy for washing and cleaning. When children are left alone with their grandmother, they watch TV all afternoons. Second typical representative is Empar, age 28, female working as a school teacher. She has low/middle income; very liberal and quite active in her life. Since she works in education her main aim in general is to help and improve people. Similar to Juan, her main motivation for renovation of the building derives from potential future energy savings; however key barrier is related to legislation challenges. She is an open person and enjoys communicating with their neighbours. She has animals (cat) and uses a lot of energy during nights. Third Spanish representative is a 55-year-old female who works as a cashier in a supermarket. She lives with her non-working husband, two children (non-working adults), and one grandchild. She has low income; is extrovert but very passive and conservative. She does not think about her future goals and does not make any plans – with her low income she just wants to survive through the day. She also reports some respiratory disease in her home. She finds potential energy savings and improving indoor environment as positive factors when discussing renovation and she would also follow the decisions of the community (does not have her own opinion on this matter). However, main barriers are related to the renovation costs. She likes visual appearance of the building and also the surroundings (clean and calm environment). She does not have any cooling or heating systems; she uses energy mainly on ventilation.
2.1.3 Hungary

First typical representative of Hungary is Marika, 70-years-old female, retired with low income. She is very introvert, conservative and passive. She does not have future plans – main concern is to pay the bills at the end of every month. Renovation could offer future savings, which is good for her; however, this is also associated to very high investment costs, which presents a barrier. She likes the neighbourhood she is living in; however, monthly costs are too high, especially considering the general low quality of the building. Technologies are old, so is the furniture and appliances. She opens the windows when it is warm and closes them when it is cold. In addition, she uses fan in the summer when it becomes hot. Second typical representative is Istvan, 50 years-old male who works as consultant. She earns middle income and is rather extrovert and active in his life. On the long run he wants to earn more money, win a lottery and move to a better house when he retires. Motivation factors lie in future savings; however, the process of renovation would cause a lot of discomfort especially considering time and investment costs. He likes the neighbourhood, external environment and relations with neighbours; however, he dislikes the visual appearance of the building. He is not satisfied with the indoor environment quality, especially during winters when there is too cold for him and causes him to become ill (sore throat). In terms of energy consumption and management he implemented thermostats; however, he does not ventilate properly to avoid heat loss. He also leaves the lights always on. Marta is the third Hungarian representative. She is 28 years old, female, on maternity leave taking care of her 2 children. She has low income and wants to earn more money in the future to move to a bigger apartment. In general, she is not so motivated for refurbishment, especially due to large investment costs and time. Considering the motivation factors, she wants to pay less for the apartment and wants better comfort. She likes the neighbourhood, the relations with neighbours and people in general. However, she dislikes high costs that she has to pay every month, especially considering the poor indoor quality (e.g. in summer it becomes very hot). Considering the energy use she frequently opens window for better air quality. She also properly switches on and off the lights to save some money on electricity.

2.1.4 Romania

All three representatives of the Romanian case are homeless people and the building represents their temporary home. They are without income (or very low). Their key long-term plan is to find a job which would secure them a better life and decent apartment. Since the building represents their temporary home they do not express motivation for renovation – the main positive factor is related to increasing the comfort and quality of indoor environment. The building is of low quality, especially considering the insulation and thermal comfort. Their energy consumption is low; they do not use appliances during the day.

2.1.5 Italy

Antonio is 45, male, unemployed with low income. He is very conservative and passive in his personal and professional life; however, very creative. He wants to improve his life, find a job, improve his living conditions and home. Considering the renovation, he does not have any interests and motivation – especially because he does not have the money. He is also very sceptical towards renovation – and this is due to not having the knowledge and proper information about the process and its outcomes and benefits. He likes the visual appearance of the building; however, he dislikes the indoor appearance (caused by bad maintenance) and relations with neighbours. His home can be very hot or very cold and also humid. Second Italian representative is an immigrant, unemployed with a very low income. He wants to leave Italy very soon so the building represents temporary home for him. Therefore, he does not have any interests for the renovation.
Third typical representative is a retired male with low income who wants to take care of his ancestors, especially to improve their economic conditions. Since he is saving a lot he does not want to waste his money on renovation. His home is rather cold and he uses bio mass heating.

2.1.6 The Netherlands

First typical representative of the Dutch case study is Patrick, 30-years-old male who works as a software developer. He has middle income and is rather analytical and passive inside; however, very active towards outside. He has no specific ambitions; he wants to sustain his current conditions. His dream is to do business in the field of blockchain technologies. He wants a Built-in TV with Play Station. He also wants a new garden where he would grow vegetables. He is calm and polite and therefore respects what is expected from the society. He likes to help neighbours if they ask for help. Considering his home environment, he often has stuffy air – he forgets to ventilate and he spends all the time indoors playing videogames or programming. He likes to work every day and often plays chess. He always keeps temperature on 21 C, ventilates when air is too bad (when he comes home from work and realizes that air is stuffy). He normally keeps shades closed. Second representative is Bea, 75-years-old female, retired with low/middle income. Her wish is to get old living in her apartment and not to worsen the current situation. She respects the status-quo. When it comes to renovation she frequently says: “Someone after me will do this” or “I just need a safe bathroom and a stair lift.”. She dislikes the rubbish in the environment. She likes to communicate with neighbours.

2.2 Case Specific Findings

The vast majority of typical case study representatives (typical residents) have low or even no income (12 out of 15) and 3 have middle income. There is not a single representative with a high income. This finding could suggest that all case studies will to some extent deal with budget and costs issues in relation to their everyday life activities and renovation (see Table 2).

Table 2: Number of personas with low / middle / high income.

<table>
<thead>
<tr>
<th>Country</th>
<th>Income</th>
<th>Low / no income</th>
<th>Middle income</th>
<th>High income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>12</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 presents several factors that people associate to their building and broader environment / surrounding. It is not possible to generalize these findings due to a small sample; however, we can see that key opinions and considerations range from those related to visual appearance and aesthetics of the building (which are generally described as positive), positive or negative relations with neighbours (which influence quality of living in a neighbourhood), indoor environment quality (generally described as of low quality influencing overall comfort – e.g. air, thermal, acoustic and visual comfort), high monthly costs for energy and maintenance, and quality of systems (generally described as of low quality).
Table 3: Likes and dislikes about the building and environment per case study / country.

<table>
<thead>
<tr>
<th>Country</th>
<th>Likes</th>
<th>Dislikes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>Quality: Insulation, noise, air quality</td>
<td>Aesthetics</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td>Community</td>
</tr>
<tr>
<td>Spain</td>
<td>Visual appearance and aesthetics</td>
<td>Relations with neighbours</td>
</tr>
<tr>
<td></td>
<td>Clean environment</td>
<td>Quality of systems</td>
</tr>
<tr>
<td></td>
<td>Neighborhood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Relations with neighbors</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>Neighborhood</td>
<td>High monthly costs</td>
</tr>
<tr>
<td></td>
<td>Environment</td>
<td>Quality of building and systems (old)</td>
</tr>
<tr>
<td></td>
<td>Relations with neighbors</td>
<td>Visual appearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Comfort</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indoor environment quality</td>
</tr>
<tr>
<td>Romania</td>
<td>Visual appearance</td>
<td>Indoor environment quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insulation</td>
</tr>
<tr>
<td>Italy</td>
<td>Visual appearance</td>
<td>Building maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relations with neighbors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humidity</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Relations with neighbors</td>
<td>Air quality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rubbish</td>
</tr>
</tbody>
</table>

Table 4 presents key motivation factors and barriers that influence the (un)willingness for renovation. Key motivation factors range from improving indoor environment quality and comfort to achieving energy savings and improving building aesthetics. Key barriers are related to investment costs, challenge of achieving common and consensus decisions due to relations with neighbours, temporary housing, lack of knowledge and legislation.

Table 4: Motivations and barriers for renovation per case study / country.

<table>
<thead>
<tr>
<th>Country</th>
<th>MOTIVATIONS for renovation</th>
<th>BARRIERS for renovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>Comfort</td>
<td>Investment costs</td>
</tr>
<tr>
<td></td>
<td>Aesthetics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indoor environment quality</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Savings</td>
<td>Legislation</td>
</tr>
<tr>
<td></td>
<td>Aesthetics</td>
<td>Relations with neighbours</td>
</tr>
<tr>
<td></td>
<td>Indoor environment quality</td>
<td>Investment costs</td>
</tr>
<tr>
<td>Hungary</td>
<td>Savings</td>
<td>Investment costs</td>
</tr>
<tr>
<td></td>
<td>Visual appearance</td>
<td>Discomfort during renovation</td>
</tr>
<tr>
<td></td>
<td>Comfort</td>
<td>Time</td>
</tr>
<tr>
<td>Romania</td>
<td>Comfort</td>
<td>Temporary house</td>
</tr>
<tr>
<td>Italy</td>
<td>Comfort</td>
<td>Investment costs</td>
</tr>
<tr>
<td></td>
<td>/</td>
<td>Lack of knowledge and scepticism</td>
</tr>
<tr>
<td></td>
<td>/</td>
<td>Bad relations with neighbours</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Comfort</td>
<td>Maintaining status quo</td>
</tr>
</tbody>
</table>
### 2.3 General Findings

Table 5 and Table 6 together with Figure 4 and Figure 5 present overall findings across different case studies/countries that are clustered together based on similar repeating factors.

**Table 5: Positive and negative considerations in relation to the building and environment**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Likes</th>
<th>Dislikes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual appearance / aesthetics</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>External environment</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Relations with neighbours</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Indoor environment quality</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Energy Costs</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

**Figure 4: Positive and negative considerations in relation to the building and environment**

**Table 6: Motivations and barriers in relation to renovation**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Motivation</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aesthetics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Indoor environment quality</strong></td>
<td><strong>13</strong></td>
<td></td>
</tr>
<tr>
<td>Investment costs</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Legislation</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Community decisions / Relations with neighbours</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Discomfort during renovation (noise, time...)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Temporary housing</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Lack of knowledge</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>30</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>
Figure 5: Motivations and barriers in relation to renovation

As demonstrated through developed personas, consortium partners believe that key negative factors and dislikes that could be addressed through deep renovation processes and could furthermore serve as initiators, motivators and enablers of respective processes are related to low/poor indoor environment quality and comfort (i.e. air quality, thermal quality, acoustic quality and visual comfort). It is interesting to note that consortium partners believe that good/bad relations with neighbours and broader community and common actions/decisions/misunderstandings/disputes can considerably influence quality of living in a building and furthermore enhance renovation processes. Additional factors that influence (un)willingness for renovation are related to: investment costs and potential savings; improving visual appearance and broader external environment; temporary housing; legislation; lack of knowledge and scepticism and discomfort during renovation process.
2.4 Recommendations future research

Following the findings from the “Personas” exercise we could provide the following recommendations for the TripleA-Reno project:

[1.] Personas present fictional characters which were created by different experts of the TripleA-Reno consortium to represent the different types of residents that might live in the context of specific TripleA-Reno case study. These findings present an additional layer of information and should be considered and interpreted as such. Partners developed personas based on their “expert hats” and mentioned/described the factors that partners consider as important or relevant (assumptions and stereotypes). In next stages of ethnographic research, we compared these findings with real data involving real people that live in these specific contexts (in the context of Task 2.3 ethnographic studies). It is interesting to compare the findings and to see if for instance quality of indoor environment in reality presents such an important decision factor that could considerably enhance renovation processes (see Table 5 and Table 6 together with Figure 4 and Figure 5). Or if the majority of residents across case studies have low or middle income which could also represent an important factor influencing the deep renovation processes (see Table 2).

[2.] The “personas” findings served for the development of the questionnaire (Task 2.2, see Heading 3 – TripleA-Reno questionnaire) and for the development of topics that have to be considered in the frame of ethnographic inquiry (Task 2.3 and Task 2.4, see Heading 4). After this exercise we understand that different factors have to be taken into account and that we should investigate and provide deep meaning through the ethnographic research. For instance, it has been demonstrated through personas that relations with and within the community play an important role influencing the satisfaction of living, (un)willingness for common actions etc. Therefore, we have to research and understand what are the relations and relationships between members of the community? What defines them? What holds the community together/makes it function (including various rituals and rules of conduct)? Or for example what does the interviewee understand by deep renovation? Do they feel this is a relevant topic? Is it being discussed much in social circles they are part of?

[3.] Personas demonstrate that there are different factors that have to be considered when it comes to renovation process and which can influence the (un)willingness of people. Even more, on the declarative level (when asked a direct question through structured questionnaire or interview) people/residents would express certain opinions. However, ethnographic research should also explore hidden perspectives; going deeper to understand specific contexts and situations (e.g. through unstructured interviews, participant observation, sensory ethnography). For instance, on declarative level people could say that they have no interest for renovation; however, going deeper we could find out that this is due to their lack of knowledge and/or misleading information; that they do not understand all the effects and/or are misinterpreting them etc.

[4.] Renovation process is something different when you consider it through the lenses of experts or through the lenses of actual people-residents. “Personas” exercise demonstrates what experts think would be crucial factors that influence the (un)willingness of people for renovation. Following the people-centred development approach (see Figure 2) this presents Step 3 – the interpretation phase (What and how will experts create/develop to address peoples’ needs?). These are the artificial “needs” that experts believe should be considered – however, they do not need to be overlapping with the real needs of people or having the same importance or relevance for them. Therefore, we have to go two steps back to firstly identify and
profile target groups (Step 1: who are we solving for? – Task 2.2) and secondly to research and analyse what the real people-residents perceive, understand, value, prefer etc. (Step 2: what people want? – Task 2.3 and Task 2.4).  

9 See Figure 2: 4 steps of the People-centred design and development approach
3 TripleA-Reno WP2 Questionnaire

Task 2.2 has developed a questionnaire to collect a large amount of data about occupants and households, such as personal key decision factors in favour of renovating the building and/or specific flat, main barriers against renovation, satisfaction over certain aspects in their home and building, energy use, consumption and habits etc. A special attention has been put on the TripleA-Reno case studies in different countries where study participants are also further involved in deeper ethnographic studies (Task 2.3 and Task 2.4). The result from the questionnaire add to the inventory of the user groups as the focus of the respective deliverable. The questionnaire is a supplement of the D2.2 and can be found in Appendix 3: TripleA-Reno questionnaire.

The following steps describe the development of the questionnaire:

1. Interviews with occupants as part of Task 2.3 (Understanding habits, practices and motivations);
2. Focus group discussions with occupants as part of Task 2.3 (Understanding habits, practices and motivations);
3. Personas workshop and further analysis involving consortium partners.

Testing:

4. Testing within the consortium where domain experts provided their comments and recommendations on specific questions and questionnaire in general.
5. Testing within target research group where building occupants provided their comments and recommendations on specific questions and questionnaire in general.
6. Completing the questionnaire within smaller sample.

Double translation:

We used the double translation process where consortium partners firstly translated the developed English version in their national language and then vice versa, from translated version back to English. Next, the 2 English versions have been compared and additional modifications and corrections have been made based on discrepancy between both. The process involved 2 independent translators, each translating their own version of the questionnaire, i.e. 1) from English to the national language and 2) from the national language back to English.

Implementation:

For the implementation of the TripleA-Reno questionnaire we used paper versions delivered directly to households (i.e. delivered physical mailbox via housing company) and/or virtual platform 1ka (www.1ka.si). 1KA is an open source application that enables services for online surveys. The development takes place at the Centre for Social Informatics, at the Faculty of Social Sciences, University of Ljubljana. The University of Ljubljana is also the formal owner or addressee of the corresponding intellectual property.

Compliance with the GDPR

1KA is an open source application that supports and combines all the stages of the data collection process through online surveying. In this context, a registered user 1KA, who is the author of a particular survey (and

---

10 The Task 2.2 is an ongoing task since we aim to achieve high frequencies of respondents per each specific country. Therefore, the final results will be modified based on the number of the research sample.
related data), plays the role of a controller of personal data, and the 1KA application has the role of a contracted processor.

The Center for Social Information Informatics (Faculty of Social Sciences, University of Ljubljana) is responsible for all 1KA installations located on the servers of the centre, so that the installations comply with the GDPR requirements. Installations are based on the Linux operating system (RedHat). This includes the main installation www.1ka.si as well as all subdomains *.1ka.

The further explanation regarding GDPR compliance and specific functionalities can be retrieved from https://www.1ka.si/d/en/gdpr.

### 3.1 Research Sample

The following section presents the research sample based on 5 participating countries in which TripleA-Reno case studies are located – Slovenia, Spain, Italy, Hungary and Greece.

#### 3.1.1 Country of residence:

Table 7: Country of residence

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>Frequency (number of respondents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>164</td>
</tr>
<tr>
<td>Italy</td>
<td>171</td>
</tr>
<tr>
<td>Greece</td>
<td>141</td>
</tr>
<tr>
<td>Hungary</td>
<td>154</td>
</tr>
<tr>
<td>Spain</td>
<td>569</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,199</td>
</tr>
</tbody>
</table>

#### 3.1.2 Sex:

[Table with percentages]

**Figure 6: Sex**
3.1.3 **Achieved education:**

<table>
<thead>
<tr>
<th>Country</th>
<th>Primary school degree or less</th>
<th>Vocational or professional school degree</th>
<th>High school degree</th>
<th>University degree or more</th>
<th>Other:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>7,8</td>
<td>65,4</td>
<td>2,0</td>
<td>20,9</td>
<td>3,9</td>
</tr>
<tr>
<td>Italy</td>
<td>10,8</td>
<td>26,9</td>
<td>23,1</td>
<td>35,4</td>
<td>3,8</td>
</tr>
<tr>
<td>Greece</td>
<td>1,2</td>
<td>15,1</td>
<td>74,4</td>
<td>7,6</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>3,4</td>
<td>38,8</td>
<td>4,3</td>
<td>52,6</td>
<td>0,9</td>
</tr>
<tr>
<td>Spain</td>
<td>5,3</td>
<td>4,3</td>
<td>83,9</td>
<td>0,2</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 7: Achieved education**

3.1.4 **Number of people in the household:**

<table>
<thead>
<tr>
<th>Country</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>25,2</td>
<td>39,4</td>
<td>23,9</td>
<td>11,6</td>
</tr>
<tr>
<td>Italy</td>
<td>24,2</td>
<td>32,0</td>
<td>21,1</td>
<td>22,7</td>
</tr>
<tr>
<td>Greece</td>
<td>16,7</td>
<td>21,4</td>
<td>34,5</td>
<td>27,4</td>
</tr>
<tr>
<td>Hungary</td>
<td>19,0</td>
<td>37,9</td>
<td>20,7</td>
<td>22,4</td>
</tr>
<tr>
<td>Spain</td>
<td>5,9</td>
<td>27,7</td>
<td>28,6</td>
<td>37,9</td>
</tr>
</tbody>
</table>

**Figure 8: Number of people in the household**

3.1.5 **Children below 10 years:**

<table>
<thead>
<tr>
<th>Country</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>36,2</td>
<td>63,8</td>
</tr>
<tr>
<td>Spain</td>
<td>28,2</td>
<td>71,8</td>
</tr>
<tr>
<td>Italy</td>
<td>18,0</td>
<td>82,0</td>
</tr>
<tr>
<td>Greece</td>
<td>14,6</td>
<td>85,4</td>
</tr>
<tr>
<td>Slovenia</td>
<td>12,2</td>
<td>87,8</td>
</tr>
</tbody>
</table>

**Figure 9: Children below 10 years**
3.1.6 Ownership status:

![Homeowner Tenant Other:](chart)

<table>
<thead>
<tr>
<th>Country</th>
<th>Homeowner</th>
<th>Tenant</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>92,8</td>
<td>7,2</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>86,1</td>
<td>10,6</td>
<td>3,3</td>
</tr>
<tr>
<td>Hungary</td>
<td>85,3</td>
<td>13,8</td>
<td>0,9</td>
</tr>
<tr>
<td>Slovenia</td>
<td>79,2</td>
<td>20,1</td>
<td>0,6</td>
</tr>
<tr>
<td>Italy</td>
<td>34,4</td>
<td>64,0</td>
<td>1,6</td>
</tr>
</tbody>
</table>

Figure 10: Ownership status

3.1.7 Building age:


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>10,4</td>
<td>70,1</td>
<td>10,4</td>
<td>7,1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>40,3</td>
<td>6,7</td>
<td>25,2</td>
<td>16,0</td>
<td>5,9</td>
<td>3,1</td>
</tr>
<tr>
<td>Greece</td>
<td>2,4</td>
<td>12,0</td>
<td>34,9</td>
<td>25,3</td>
<td>22,9</td>
<td>2,0</td>
</tr>
<tr>
<td>Hungary</td>
<td>6,9</td>
<td>3,4</td>
<td>32,8</td>
<td>44,0</td>
<td>7,8</td>
<td>7,2</td>
</tr>
<tr>
<td>Spain</td>
<td>12,7</td>
<td>8,0</td>
<td>25,5</td>
<td>25,9</td>
<td>26,5</td>
<td>14</td>
</tr>
</tbody>
</table>

Figure 11: Building age

Just looking at the research sample we can already see the important differences between participating country case studies and their research participants, i.e. occupants. In Spanish and Greek context, we observe that the vast majority of research participants have completed university degree or more (i.e. 83,9% in Spanish and 74,4% in Greek context), whereas in Slovenian context we face lower levels of highly educated participants (i.e. 65,4 % with completed vocational/professional degree). In Hungarian and Italian context, the achieved education is more balanced and equally distributed (see Figure 7).

Taking into account the number of people living in the household (see Figure 8) we can see that this is relatively equally distributed among countries with the case of Slovenia having the most single living participants (i.e. 25,2%) and Spanish case with 66,5% households with 3, 4 or more participants living in one household. Similarly, we can observe that in the case of Slovenia there is 87,8 % of households without children below 10 years (see Figure 9) and 71,8% for the Spanish case. Comparing the results, we could argue that whereas 66,5% of Spanish households include 3, 4 or more people living in one household, they are
mainly over 10 years old and in majority do not include young families with smaller children. In fact, this observation is mainly relevant for all countries where Hungary compared to other cases represents the case study having the most families with smaller children living in households (36,2%), followed by Spain (28,2%), Italy (18%), Greece (14,6%) and Slovenia (12,2%).

Looking at the ownership status (see Figure 10) we can see that the majority of respondents are homeowners with an exception of Italy where tenants represent the majority (64%).

Taking into account the building age (see Figure 11) we notice that in Italy and Slovenia, the buildings in which research participants live are older compared to other case studies. In Italy for instance 40,3% of participants are living in buildings which are more than 70 years old and 70,1% of Slovenian participants are living in 60 to 40 years’ old buildings. On the other hand, comparing to other countries, Spanish and Greek cases have the highest proportion of participants living in buildings constructed from 2001 onwards, i.e. 26,5% in the case of Spain and 22,9% in the case of Greece.

Table 8: Comparison among country samples

<table>
<thead>
<tr>
<th>Country</th>
<th>Achieved Education</th>
<th>Number of people in the household</th>
<th>Children below 10 years</th>
<th>Ownership</th>
<th>Building age (compared to other samples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>Lower X ≤ 2</td>
<td>No</td>
<td>Owners</td>
<td>Relatively old</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>Equally distributed</td>
<td>Equally distributed No</td>
<td>Tenants</td>
<td>Relatively old</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>Higher X ≥ 3</td>
<td>Yes</td>
<td>Owners</td>
<td>Relatively new</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>Equally distributed</td>
<td>Equally distributed Yes</td>
<td>Owners</td>
<td>Relatively new</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Higher X ≥ 3</td>
<td>Yes</td>
<td>Owners</td>
<td>Relatively new</td>
<td></td>
</tr>
</tbody>
</table>

### 3.2 Renovation

The following section provides certain preliminary results comparing 5 different countries in relation to renovation of building / particular flat together with personal decision factors in favour of renovation and key barriers against renovation.

#### 3.2.1 Is your building/flat currently in the process of renovation?

<table>
<thead>
<tr>
<th>Country of residence:</th>
<th>Building as a whole</th>
<th>My flat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
</tr>
<tr>
<td>Slovenia</td>
<td>88,2%</td>
<td>11,8%</td>
</tr>
<tr>
<td>Hungary</td>
<td>50,0%</td>
<td>50,0%</td>
</tr>
<tr>
<td>Spain</td>
<td>34,0%</td>
<td>66,0%</td>
</tr>
<tr>
<td>Italy</td>
<td>32,7%</td>
<td>67,3%</td>
</tr>
<tr>
<td>Greece</td>
<td>22,8%</td>
<td>77,2%</td>
</tr>
</tbody>
</table>

11 Table 8 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 8 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
3.2.2 If yes, what precisely is being renovated?

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>Q10_Q11a What precisely: Envelope</th>
<th>Q10_Q11b What precisely: Windows and/or doors</th>
<th>Q10_Q11c What precisely: Installations (heating, cooling, ventilation)</th>
<th>Q10_Q12a What precisely: Envelope</th>
<th>Q10_Q12b What precisely: Windows and/or doors</th>
<th>Q10_Q12c What precisely: Installations (heating, cooling, ventilation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>97,8%</td>
<td>2,2%</td>
<td>89,9%</td>
<td>10,1%</td>
<td>47,0%</td>
<td>53,0%</td>
</tr>
<tr>
<td>Italy</td>
<td>74,4%</td>
<td>25,6%</td>
<td>76,3%</td>
<td>23,7%</td>
<td>77,5%</td>
<td>22,5%</td>
</tr>
<tr>
<td>Greece</td>
<td>76,5%</td>
<td>23,5%</td>
<td>66,7%</td>
<td>33,3%</td>
<td>73,7%</td>
<td>26,3%</td>
</tr>
<tr>
<td>Hungary</td>
<td>38,2%</td>
<td>61,8%</td>
<td>57,3%</td>
<td>42,7%</td>
<td>24,7%</td>
<td>75,3%</td>
</tr>
<tr>
<td>Spain</td>
<td>71,4%</td>
<td>28,6%</td>
<td>35,0%</td>
<td>65,0%</td>
<td>28,3%</td>
<td>71,7%</td>
</tr>
</tbody>
</table>

Figure 13: If yes, what precisely is being renovated in the building?
If yes, what precisely is being renovated in the flat?

Figure 12 presents the percentages of buildings and/or flats in 5 different participating country samples that are currently in the process of renovation (envelope, windows and/or systems) or have been renovated in the last 10 years. Based on the results we can see that in the case of Slovenia the vast majority of buildings (88.2%) and flats (76.6%) has been renovated or are in the process of renovation. This is followed by Hungary (50% for buildings / 67.3% for flats), Spain (34% for buildings / 42.2% for flats), Italy (32.7% for buildings / 23.1% for flats) and Greece (22.8% for buildings / 42.6% for flats).

Taking into consideration the samples that have been or are currently in the process of building renovation (see Figure 14) we can observe relatively large differences between countries. Whereas in Slovenia the key focus is placed on renovating the envelope (97.8%) and windows (89.9%) the Hungarian case is focusing less on the envelope (38.2%) compared to other cases and Spanish case is focusing less on renovating windows (35%) compared to other cases. In the case of Italian and Greek sample we can observe relatively more focus on installations compared to others, i.e. 77.5% for the case of Italy and 73.7% in the case of Greece.

Taking into consideration the samples that have been or are currently in the process of flat/apartment renovation (see Figure 14) we can also observe relatively large differences between countries. In the context of flat renovation in Slovenia the key focus is also placed on the envelope (71.4%) and especially on windows (90.4%). Whereas in the Italian case we can observe relatively high focus on building renovation it is very different when it comes to individual flats and apartments where we observe lower levels, especially considering the envelope renovation (10.5%). In Hungarian case we can observe more efforts when it comes to renovation of windows on the individual apartment level (85.7%) compared to other renovation activities, be it on the apartment or building levels. In the case of Spain, we can see a different example, where renovation efforts considering the building envelope are identified (71.4%); however, on individual apartment levels we observe higher renovation levels when it comes to windows (85.8%) and installations (73.1%).
Table 9: Comparison among country samples – renovation on a building and individual apartment levels

<table>
<thead>
<tr>
<th>Country</th>
<th>BUILDING</th>
<th>FLAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Envelope</td>
<td>Windows / doors</td>
</tr>
<tr>
<td>Slovenia</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Italy</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Greece</td>
<td>YES</td>
<td>Moderate</td>
</tr>
<tr>
<td>Hungary</td>
<td>NO</td>
<td>Moderate</td>
</tr>
<tr>
<td>Spain</td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

Cluster: YES (from 71% to 100%) / Moderate (from 40% to 70%) / NO (from 0% to 39%)

3.2.3 Who initiated the renovation process of your building?

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>Q13a Who initiated the renovation p: Myself</th>
<th>Q13b Who initiated the renovation p: Neighbours/other individual owners in the building</th>
<th>Q13c Who initiated the renovation p: Landlord</th>
<th>Q13d Who initiated the renovation p: Building assembly</th>
<th>Q13e Who initiated the renovation p: Housing Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>13,5%</td>
<td>10,3%</td>
<td>16,1%</td>
<td>59,4%</td>
<td>27,7%</td>
</tr>
<tr>
<td>Italy</td>
<td>23,6%</td>
<td>3,6%</td>
<td>10,9%</td>
<td>4,5%</td>
<td>27,3%</td>
</tr>
<tr>
<td>Greece</td>
<td>37,5%</td>
<td>1,4%</td>
<td>25,0%</td>
<td>11,1%</td>
<td>1,4%</td>
</tr>
<tr>
<td>Hungary</td>
<td>13,0%</td>
<td>11,3%</td>
<td>.9%</td>
<td>29,6%</td>
<td>14,8%</td>
</tr>
<tr>
<td>Spain</td>
<td>37,4%</td>
<td>1,1%</td>
<td>5,9%</td>
<td>22,0%</td>
<td>.7%</td>
</tr>
</tbody>
</table>

Figure 15: Who initiated the renovation process of your building?

---

Table 9 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
Table 10: Comparison among country samples – who initiated the renovation process of your building

<table>
<thead>
<tr>
<th>Country</th>
<th>Myself</th>
<th>Neighbours / other individual owners in the building</th>
<th>Landlord</th>
<th>Building Assembly</th>
<th>Housing Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>Moderate</td>
</tr>
<tr>
<td>Italy</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>Moderate</td>
</tr>
<tr>
<td>Greece</td>
<td>Moderate</td>
<td>NO</td>
<td>Moderate</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Hungary</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>Moderate</td>
<td>NO</td>
</tr>
<tr>
<td>Spain</td>
<td>Moderate</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Cluster: YES (from 50% to 100%) / Moderate (from 25% to 49%) / NO (from 0% to 24%)

Based on the results from Figure 15 and Table 10 we can observe that the initiation of the renovation process is not precisely determined and there is no significantly important initiator with the exception of the building assembly in the case of Slovenia (59,4%). The housing companies as initiators play a moderate role in Slovenia (27,7%) and Italy (27,3%), still compared to other initiators and other country samples it reaches relatively high values. The individual respondents as renovation initiators are to some extent relevant in the Greek (37,5%) and Spanish (37,4%) context. Other individuals (e.g. neighbours) are not considered as important renovation initiators in all 5 observed cases.

3.3 Personal key decision factors in favour of renovation

3.3.1 Financial savings

<table>
<thead>
<tr>
<th>Financial savings</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>1,5%</td>
<td>2,0%</td>
<td>10,0%</td>
<td>22,8%</td>
<td>63,7%</td>
<td>4,5</td>
</tr>
<tr>
<td>Hungary</td>
<td>1,0%</td>
<td>4,8%</td>
<td>11,5%</td>
<td>19,2%</td>
<td>63,5%</td>
<td>4,4</td>
</tr>
<tr>
<td>Greece</td>
<td>3,6%</td>
<td>7,3%</td>
<td>7,3%</td>
<td>14,5%</td>
<td>67,3%</td>
<td>4,3</td>
</tr>
<tr>
<td>Slovenia</td>
<td>7,2%</td>
<td>2,2%</td>
<td>13,7%</td>
<td>10,1%</td>
<td>66,9%</td>
<td>4,3</td>
</tr>
<tr>
<td>Italy</td>
<td>10,3%</td>
<td>11,8%</td>
<td>16,2%</td>
<td>19,1%</td>
<td>42,6%</td>
<td>3,7</td>
</tr>
</tbody>
</table>

13 Table 10 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.

14 We should, however, add a comment here that general conclusions at country levels cannot be made solely from the questionnaire result. The results presented here mainly reflect the situation in pilot case studies. This means that the sample is not a reflection of the general population in specific countries, but more focusing on our specific TripleA-Reno case studies.
Figure 16: Personal key decision factors in favour of renovation – financial savings

Figure 16 demonstrates that financial savings present a key decision factor in favor of renovation in all observed countries. The only exception can be identified for the Italian case where values are lower compared to other four countries.

3.3.2 Improving aesthetic

Figure 17: Personal key decision factors in favour of renovation – improving aesthetic

Figure 17 demonstrates that improving aesthetic plays a considerable decision factor towards renovation in the case of Slovenia and Hungary, relatively moderate factor in the case of Greece and Spain and relatively modest factor in the case of Italy, especially when comparing to other countries.
3.3.3 Improving health, wellbeing

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>1,3%</td>
<td>4,1%</td>
<td>24,9%</td>
<td>68,8%</td>
<td>4,6</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>1,9%</td>
<td>9,3%</td>
<td>24,1%</td>
<td>63,0%</td>
<td>4,4</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>4,6%</td>
<td>12,2%</td>
<td>18,3%</td>
<td>64,1%</td>
<td>4,4</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>6,3%</td>
<td>12,7%</td>
<td>30,2%</td>
<td>49,2%</td>
<td>4,1</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>1,9%</td>
<td>39,8%</td>
<td>20,4%</td>
<td>30,1%</td>
<td>3,7</td>
<td></td>
</tr>
</tbody>
</table>

Figure 18: Personal key decision factors in favour of renovation – improving health, wellbeing

Figure 18 demonstrates that improving health and wellbeing is considered as important decision factor towards renovation, especially in Spain, Greece, Slovenia and Italy and a moderate, yet still important factor in the Hungarian case.

3.3.4 Increased value of the property

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>4,5%</td>
<td>7,3%</td>
<td>31,2%</td>
<td>31,2%</td>
<td>39,5%</td>
<td>3,8</td>
</tr>
<tr>
<td>Spain</td>
<td>4,5%</td>
<td>9,6%</td>
<td>17,3%</td>
<td>26,0%</td>
<td>35,6%</td>
<td>3,6</td>
</tr>
<tr>
<td>Hungary</td>
<td>11,5%</td>
<td>13,2%</td>
<td>17,0%</td>
<td>24,5%</td>
<td>34,0%</td>
<td>3,6</td>
</tr>
<tr>
<td>Greece</td>
<td>11,3%</td>
<td>16,7%</td>
<td>13,3%</td>
<td>16,7%</td>
<td>18,3%</td>
<td>2,7</td>
</tr>
<tr>
<td>Italy</td>
<td>35,0%</td>
<td>16,7%</td>
<td>13,3%</td>
<td>16,7%</td>
<td>18,3%</td>
<td>2,7</td>
</tr>
</tbody>
</table>
Figure 19: Personal key decision factors in favour of renovation – Increased value of the property

Figure 19 demonstrates that increased value of property is considered as relatively important decision factor towards renovation in Slovenia, Spain, Hungary and Greece. However, it is not considered as important in the case of Italy compared to other observed countries.

3.3.5 Environment

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>11,3</td>
<td>4,0</td>
<td>21,8</td>
<td>23,4</td>
<td>39,5</td>
<td>4,3</td>
</tr>
<tr>
<td>Spain</td>
<td>4,5</td>
<td>7,3</td>
<td>31,2</td>
<td>31,2</td>
<td>25,9</td>
<td>3,7</td>
</tr>
<tr>
<td>Hungary</td>
<td>11,5</td>
<td>9,6</td>
<td>17,3</td>
<td>26,0</td>
<td>35,6</td>
<td>4,4</td>
</tr>
<tr>
<td>Greece</td>
<td>11,3</td>
<td>13,2</td>
<td>17,0</td>
<td>24,5</td>
<td>34,0</td>
<td>4,5</td>
</tr>
<tr>
<td>Italy</td>
<td>35,0</td>
<td>16,7</td>
<td>13,3</td>
<td>16,7</td>
<td>18,3</td>
<td>3,0</td>
</tr>
</tbody>
</table>

Figure 20: Personal key decision factors in favour of renovation – Environment

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>7,3</td>
<td>6,4</td>
<td>16,5</td>
<td>22,0</td>
<td>47,7</td>
<td>4,0</td>
</tr>
<tr>
<td>Greece</td>
<td>7,8</td>
<td>3,9</td>
<td>19,6</td>
<td>23,5</td>
<td>45,1</td>
<td>3,9</td>
</tr>
<tr>
<td>Spain</td>
<td>3,9</td>
<td>7,3</td>
<td>19,7</td>
<td>31,0</td>
<td>38,1</td>
<td>3,9</td>
</tr>
<tr>
<td>Hungary</td>
<td>2,9</td>
<td>14,6</td>
<td>30,1</td>
<td>34,0</td>
<td>18,4</td>
<td>3,5</td>
</tr>
<tr>
<td>Italy</td>
<td>21,3</td>
<td>19,7</td>
<td>23,0</td>
<td>9,8</td>
<td>26,2</td>
<td>3,0</td>
</tr>
</tbody>
</table>
Figure 20 demonstrates that the environment is considered as relatively important decision factor towards renovation especially in Slovenia, Greece and Spain, and to a moderate extent in the case of Hungary. However, it is not considered as important in the case of Italy compared to other observed countries.

Table 11: Comparison among country samples – personal key decision factors in favour of renovation (1)

<table>
<thead>
<tr>
<th>Country</th>
<th>Financial savings</th>
<th>Improving aesthetics</th>
<th>Improving health, wellbeing</th>
<th>Increased value of the property</th>
<th>Environment</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>4,3</td>
<td>4,1</td>
<td>4,4</td>
<td>3,8</td>
<td>4,0</td>
<td>4,1</td>
</tr>
<tr>
<td>Italy</td>
<td>3,7</td>
<td>2,9</td>
<td>4,1</td>
<td>2,7</td>
<td>3,0</td>
<td>3,3</td>
</tr>
<tr>
<td>Greece</td>
<td>4,4</td>
<td>3,5</td>
<td>4,4</td>
<td>3,6</td>
<td>3,9</td>
<td>3,9</td>
</tr>
<tr>
<td>Hungary</td>
<td>4,4</td>
<td>3,8</td>
<td>3,7</td>
<td>3,6</td>
<td>3,5</td>
<td>3,8</td>
</tr>
<tr>
<td>Spain</td>
<td>4,5</td>
<td>3,4</td>
<td>4,6</td>
<td>3,7</td>
<td>3,9</td>
<td>4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4,2</td>
<td>3,5</td>
<td>4,2</td>
<td>3,4</td>
<td>3,7</td>
<td></td>
</tr>
</tbody>
</table>

Table 11 demonstrates that reaching financial savings and improving health and wellbeing present the most important decision factors towards renovation in all countries. This is followed by environment (e.g. renewable energy, reducing CO2 emissions) and improving aesthetics. Increasing the value of property is considered as least important factor compared to others. In every country there is at least one considerable important factor identified. Table 12 presents the important decision factors in favour of renovation from the most to the least important per specific country. In case of Italy we can observe the lowest values compared to other countries with 3 out of 5 categories reaching mean values lower or equal to 3,0, i.e. improving aesthetics, Increased value of the property and environment.

Table 12: Comparison among country samples – personal key decision factors in favour of renovation (2)

<table>
<thead>
<tr>
<th>Slovenia</th>
<th>Italy</th>
<th>Greece</th>
<th>Hungary</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Improving health, wellbeing</td>
<td>1) Improving health, wellbeing</td>
<td>1) Improving health, wellbeing</td>
<td>1) Financial savings</td>
<td>1) Improving health, wellbeing</td>
</tr>
<tr>
<td>2) Financial savings</td>
<td>2) Financial savings</td>
<td>2) Improving aesthetics</td>
<td>2) Improving health, wellbeing</td>
<td></td>
</tr>
<tr>
<td>3) Improving aesthetics</td>
<td>3) Environment</td>
<td>3) Improving health, wellbeing</td>
<td>3) Environment</td>
<td></td>
</tr>
<tr>
<td>4) Environment</td>
<td>4) Increased value of property</td>
<td>4) Increased value of property</td>
<td>4) Improved aesthetics</td>
<td></td>
</tr>
<tr>
<td>5) Increased value of property</td>
<td>5) Improving aesthetics</td>
<td>5) Environment</td>
<td>5) Improving health, wellbeing</td>
<td></td>
</tr>
</tbody>
</table>

15 Table 11 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
3.4 Main barriers against renovation

3.4.1 Achieving common and jointly agreed decisions

<table>
<thead>
<tr>
<th>Q16a What were/are the main barrier: Achieving common and jointly agreed decisions (in household, building etc.)</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
<td>Hungary</td>
<td>4,9%</td>
<td>13,6%</td>
<td>20,4%</td>
<td>22,3%</td>
<td>38,8%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>8,7%</td>
<td>5,2%</td>
<td>27,0%</td>
<td>20,0%</td>
<td>39,1%</td>
<td>3,8</td>
</tr>
<tr>
<td>Spain</td>
<td>14,2%</td>
<td>6,6%</td>
<td>14,2%</td>
<td>30,1%</td>
<td>35,0%</td>
<td>3,7</td>
</tr>
<tr>
<td>Greece</td>
<td>30,8%</td>
<td>5,1%</td>
<td>25,6%</td>
<td>23,1%</td>
<td>15,4%</td>
<td>2,9</td>
</tr>
<tr>
<td>Italy</td>
<td>38,2%</td>
<td>14,5%</td>
<td>16,4%</td>
<td>16,4%</td>
<td>14,5%</td>
<td>2,5</td>
</tr>
</tbody>
</table>

Achieving common decisions  
1 - Not important  2  3  4  5 - Very important  Mean

Figure 21: Main barriers against renovation – Achieving common and jointly agreed decisions

Figure 21 demonstrates that achieving common and agreed decisions in households, buildings etc. are considered as relatively important barriers against renovation, especially in Hungary, Slovenia and Spain. In Greek and Italian context these are considered as less important barriers compared to other countries or/and other barriers.

3.4.2 Legal barriers

<table>
<thead>
<tr>
<th>Q16b What were/are the main barrier: Legal barriers</th>
<th>1 - Not important</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very important</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
<td>Spain</td>
<td>11,1%</td>
<td>17,7%</td>
<td>30,3%</td>
<td>26,9%</td>
<td>14,0%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>29,1%</td>
<td>12,8%</td>
<td>32,6%</td>
<td>18,6%</td>
<td>7,0%</td>
<td>2,6</td>
</tr>
<tr>
<td>Greece</td>
<td>42,9%</td>
<td>7,1%</td>
<td>26,2%</td>
<td>7,1%</td>
<td>16,7%</td>
<td>2,5</td>
</tr>
<tr>
<td>Italy</td>
<td>32,2%</td>
<td>32,2%</td>
<td>15,3%</td>
<td>11,9%</td>
<td>8,5%</td>
<td>2,3</td>
</tr>
<tr>
<td>Hungary</td>
<td>60,8%</td>
<td>21,6%</td>
<td>13,7%</td>
<td>1,0%</td>
<td>2,9%</td>
<td>1,6</td>
</tr>
</tbody>
</table>
Figure 22: Main barriers against renovation – Legal barriers

Figure 22 demonstrates that the legal barriers are not considered as the most important barriers against renovation, especially compared to other observed renovation barriers, with the exception of Spain where we can observe moderate importance of respective barriers.

3.4.3 Costs

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>Q16c What were/are the main barrier: Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 - Not important</td>
</tr>
<tr>
<td></td>
<td>Row N %</td>
</tr>
<tr>
<td>Greece</td>
<td>1,9%</td>
</tr>
<tr>
<td>Spain</td>
<td>1,1%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>7,1%</td>
</tr>
<tr>
<td>Italy</td>
<td>18,0%</td>
</tr>
</tbody>
</table>

Figure 23: Main barriers against renovation – Costs
Figure 23 demonstrates that costs are extremely important barriers against renovation, especially in Greek, Hungarian, Spanish and Slovenian context. Interestingly they are considered as less important barriers in the Italian context comparing to other observed countries.

Table 13: Comparison among country samples - main barriers against renovation (1)

<table>
<thead>
<tr>
<th>Country</th>
<th>Achieving common and jointly agreed decisions</th>
<th>Legal barriers</th>
<th>Costs</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>3.8</td>
<td>2.6</td>
<td>3.9</td>
<td>3.4</td>
</tr>
<tr>
<td>Italy</td>
<td>2.5</td>
<td>2.3</td>
<td>3.4</td>
<td>2.7</td>
</tr>
<tr>
<td>Greece</td>
<td>2.9</td>
<td>2.5</td>
<td>4.6</td>
<td>3.3</td>
</tr>
<tr>
<td>Hungary</td>
<td>3.8</td>
<td>1.6</td>
<td>4.5</td>
<td>3.3</td>
</tr>
<tr>
<td>Spain</td>
<td>3.7</td>
<td>3.1</td>
<td>4.5</td>
<td>3.7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3.3</td>
<td>2.4</td>
<td>4.2</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Table 13 demonstrates that costs are considered as the most important barrier against renovation in all countries, with Greece, Hungary and Spain as the most significant. This is followed by achieving common and jointly agreed decisions in households, buildings etc. Legal barriers are not considered as key barriers against renovation in all countries. It is interesting to note that in Italy and Greece only costs have been identified as important barriers whereas other factors are not considered as such. On the other hand, we can identify that in Spanish context all three factors are considered as important barriers against renovation. Comparing to other countries, Italian respondents do not rate the 3 barriers (decisions, legal and costs) as much relevant as they do in other countries.

Table 14: Comparison among country samples - main barriers against renovation (2)

<table>
<thead>
<tr>
<th>Slovenia</th>
<th>Italy</th>
<th>Greece</th>
<th>Hungary</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Costs</td>
<td>1) Costs</td>
<td>1) Costs</td>
<td>1) Costs</td>
<td>1) Costs</td>
</tr>
<tr>
<td>2) Achieving common and jointly agreed decisions</td>
<td>2) Achieving common and jointly agreed decisions</td>
<td>2) Achieving common and jointly agreed decisions</td>
<td>3) Legal barriers</td>
<td></td>
</tr>
</tbody>
</table>

Table 13 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
3.5 Satisfaction

3.5.1 Home as a healthy environment

| Q17 Would you consider your home a healthy environment at this moment? |
|--------------------------|------------------|------------------|
| Yes | No |
| Row N % | Row N % |
| Slovenia | 90,1% | 9,9% |
| Hungary | 86,0% | 14,0% |
| Spain | 67,1% | 32,9% |
| Greece | 65,6% | 34,4% |
| Italy | 56,1% | 43,9% |

Figure 24: Would you consider your home a healthy environment in this moment

Figure 24 demonstrates that the vast majority of respondents in Slovenia (90,1%) and Italy (86%) consider their home as a healthy environment, followed by Greece (67,1%) and Hungary (65,6%). The lowest rates can be observed in Spain where 56,1% of respondents agree that their home presents a healthy environment to live in.

3.5.2 Satisfaction regarding different aspects in home – temperature

<table>
<thead>
<tr>
<th>Q19a How satisfied are you over the: Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Not satisfied</td>
</tr>
<tr>
<td>Row N %</td>
</tr>
<tr>
<td>Slovenia</td>
</tr>
<tr>
<td>Hungary</td>
</tr>
<tr>
<td>Spain</td>
</tr>
<tr>
<td>Greece</td>
</tr>
<tr>
<td>Italy</td>
</tr>
</tbody>
</table>
### Temperature

<table>
<thead>
<tr>
<th>Country</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>2.0</td>
<td>3.3</td>
<td>23.7</td>
<td>27.0</td>
<td>44.1</td>
<td>6.3</td>
</tr>
<tr>
<td>Hungary</td>
<td>1.7</td>
<td>8.7</td>
<td>22.6</td>
<td>29.6</td>
<td>37.4</td>
<td>8.7</td>
</tr>
<tr>
<td>Spain</td>
<td>7.2</td>
<td>12.7</td>
<td>26.1</td>
<td>34.1</td>
<td>19.9</td>
<td>8.1</td>
</tr>
<tr>
<td>Greece</td>
<td>5.5</td>
<td>27.3</td>
<td>30.9</td>
<td>30.9</td>
<td>5.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Italy</td>
<td>21.4</td>
<td>18.6</td>
<td>24.3</td>
<td>25.7</td>
<td>10.0</td>
<td>2.8</td>
</tr>
</tbody>
</table>

**Figure 25:** How satisfied are you over the following aspects in your home – temperature.

### Satisfaction regarding different aspects in home – air quality

#### Q19b How satisfied are you over the: Air quality

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>0.9%</td>
<td>6.2</td>
<td>9.7</td>
<td>42.5</td>
<td>40.7</td>
<td>4.2</td>
</tr>
<tr>
<td>Spain</td>
<td>3.1%</td>
<td>9.7</td>
<td>23.1</td>
<td>39.0</td>
<td>25.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Greece</td>
<td>0.0%</td>
<td>14.3</td>
<td>32.1</td>
<td>41.1</td>
<td>12.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Slovenia</td>
<td>6.9%</td>
<td>11.1</td>
<td>31.3</td>
<td>25.7</td>
<td>25.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Italy</td>
<td>8.7%</td>
<td>18.8</td>
<td>37.7</td>
<td>26.1</td>
<td>8.7</td>
<td>3.1</td>
</tr>
</tbody>
</table>

**Figure 26:** How satisfied are you over the following aspects in your home – air quality.
### 3.5.4 Satisfaction regarding different aspects in home – natural illumination

#### Q19c How satisfied are you over the: Natural illumination (sun)

<table>
<thead>
<tr>
<th>Q2 Country of residence</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>0,0%</td>
<td>0,9%</td>
<td>10,4%</td>
<td>30,4%</td>
<td>58,3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,5</td>
</tr>
<tr>
<td>Spain</td>
<td>2,0%</td>
<td>5,6%</td>
<td>9,7%</td>
<td>26,2%</td>
<td>56,5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,3</td>
</tr>
<tr>
<td>Greece</td>
<td>0,0%</td>
<td>1,8%</td>
<td>21,8%</td>
<td>29,1%</td>
<td>47,3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4,2</td>
</tr>
<tr>
<td>Slovenia</td>
<td>4,1%</td>
<td>5,5%</td>
<td>22,6%</td>
<td>28,1%</td>
<td>39,7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,9</td>
</tr>
<tr>
<td>Italy</td>
<td>5,4%</td>
<td>12,2%</td>
<td>23,0%</td>
<td>35,1%</td>
<td>24,3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,6</td>
</tr>
</tbody>
</table>

#### Natural illumination

- 1 - Not satisfied
- 2
- 3
- 4
- 5 - Very satisfied
- Mean

<table>
<thead>
<tr>
<th>Country of residence</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>0,9%</td>
<td>10,4%</td>
<td>30,4%</td>
<td>58,3%</td>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>2,0%</td>
<td>5,6%</td>
<td>9,7%</td>
<td>26,2%</td>
<td>56,5%</td>
<td>4,3</td>
</tr>
<tr>
<td>Greece</td>
<td>1,8%</td>
<td>21,8%</td>
<td>29,1%</td>
<td>47,3%</td>
<td>4,2</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>4,1%</td>
<td>22,6%</td>
<td>28,1%</td>
<td>39,7%</td>
<td>3,9</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>5,4%</td>
<td>12,2%</td>
<td>23,0%</td>
<td>35,1%</td>
<td>24,3%</td>
<td>3,6</td>
</tr>
</tbody>
</table>

**Figure 27:** How satisfied are you over the following aspects in your home – natural illumination.

### 3.5.5 Satisfaction regarding different aspects in home – artificial illumination

#### Q19d How satisfied are you over the: Artificial illumination (lights)

<table>
<thead>
<tr>
<th>Q2 Country of residence</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>0,0%</td>
<td>0,0%</td>
<td>8,7%</td>
<td>41,7%</td>
<td>49,6%</td>
<td>4,4</td>
</tr>
<tr>
<td>Greece</td>
<td>1,9%</td>
<td>5,6%</td>
<td>29,6%</td>
<td>37,0%</td>
<td>25,9%</td>
<td>3,8</td>
</tr>
<tr>
<td>Spain</td>
<td>1,6%</td>
<td>6,5%</td>
<td>27,9%</td>
<td>42,4%</td>
<td>21,6%</td>
<td>3,8</td>
</tr>
<tr>
<td>Slovenia</td>
<td>6,8%</td>
<td>3,0%</td>
<td>33,1%</td>
<td>26,3%</td>
<td>30,8%</td>
<td>3,7</td>
</tr>
<tr>
<td>Italy</td>
<td>5,7%</td>
<td>15,7%</td>
<td>17,1%</td>
<td>42,9%</td>
<td>18,6%</td>
<td>3,5</td>
</tr>
</tbody>
</table>
### Artificial illumination

<table>
<thead>
<tr>
<th>Country</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>1.4</td>
<td>3.3</td>
<td>5.2</td>
<td>25.3</td>
<td>33.3</td>
<td>4.4</td>
</tr>
<tr>
<td>Greece</td>
<td>1.5</td>
<td>3.3</td>
<td>5.2</td>
<td>32.1</td>
<td>29.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Spain</td>
<td>1.6</td>
<td>3.3</td>
<td>5.2</td>
<td>28.3</td>
<td>33.2</td>
<td>6.4</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1.7</td>
<td>3.3</td>
<td>5.2</td>
<td>26.3</td>
<td>33.3</td>
<td>7.5</td>
</tr>
<tr>
<td>Italy</td>
<td>1.8</td>
<td>3.3</td>
<td>5.2</td>
<td>30.8</td>
<td>21.6</td>
<td>8.6</td>
</tr>
</tbody>
</table>

**Figure 28:** How satisfied are you over the following aspects in your home – artificial illumination.

### 3.5.6 Satisfaction regarding different aspects in home – humidity

<table>
<thead>
<tr>
<th>Q19e How satisfied are you over the: Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Not satisfied</td>
</tr>
<tr>
<td>Row N %</td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
</tr>
<tr>
<td>Hungary</td>
</tr>
<tr>
<td>Slovenia</td>
</tr>
<tr>
<td>Spain</td>
</tr>
<tr>
<td>Greece</td>
</tr>
<tr>
<td>Italy</td>
</tr>
</tbody>
</table>

**Figure 29:** How satisfied are you over the following aspects in your home – humidity.

### 3.5.7 Satisfaction regarding different aspects in home – noise

<table>
<thead>
<tr>
<th>Q19f How satisfied are you over the: Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Not satisfied</td>
</tr>
<tr>
<td>Row N %</td>
</tr>
<tr>
<td>Hungary</td>
</tr>
</tbody>
</table>
Table 15 demonstrates that the respondents in all observed countries are relatively satisfied over different aspects in their home, with Hungarian (x=4,2) respondents being the most satisfied and Italian as least satisfied (x=3,2). The natural illumination can be considered as an aspect over which the respondents in all countries are the most satisfied with, followed by the artificial illumination. Temperature is an aspect where means are the lowest in all countries, with the exception of Slovenia in which temperature is considered as an aspect with which the respondents are the most satisfied with, compared to the other observed aspects. On the other hand, Italian respondents are the least satisfied with the temperature (x=2,8) as well as with the humidity (x=2,8) in their homes. Overall, temperature, humidity and noise could be considered as three most important aspects that offer potentials for future improvements.

---

17 Table 15 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
Table 16: Comparison among country samples - satisfaction over different aspects in home (2)

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Slovenia</th>
<th>Italy</th>
<th>Greece</th>
<th>Hungary</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Temperature</td>
<td>1) Natural Illumination</td>
<td>1) Natural Illumination</td>
<td>1) Natural Illumination</td>
<td>1) Natural Illumination</td>
<td>1) Natural Illumination</td>
</tr>
<tr>
<td>2) Natural Illumination</td>
<td>2) Artificial Illumination</td>
<td>2) Artificial Illumination</td>
<td>2) Artificial Illumination</td>
<td>2) Artificial Illumination</td>
<td>2) Artificial Illumination</td>
</tr>
<tr>
<td>3) Artificial Illumination</td>
<td>3) Noise</td>
<td>3) Air Quality</td>
<td>3) Air Quality</td>
<td>3) Air Quality</td>
<td>3) Air Quality</td>
</tr>
<tr>
<td>5) Air Quality</td>
<td>5) Humidity</td>
<td>5) Temperature</td>
<td>5) Temperature</td>
<td>5) Temperature</td>
<td>5) Temperature</td>
</tr>
<tr>
<td>6) Noise</td>
<td>6) Noise</td>
<td>6) Temperature</td>
<td>6) Temperature</td>
<td>6) Temperature</td>
<td>6) Temperature</td>
</tr>
</tbody>
</table>

3.5.8 Satisfaction regarding different aspects in building – attractiveness and aesthetics

<table>
<thead>
<tr>
<th>Attractiveness and aesthetics</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 Country of residence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>4,1%</td>
<td>6,9%</td>
<td>31,7%</td>
<td>29,0%</td>
<td>28,3%</td>
<td>3,7</td>
</tr>
<tr>
<td>Spain</td>
<td>3,8%</td>
<td>12,1%</td>
<td>30,6%</td>
<td>34,1%</td>
<td>19,4%</td>
<td>3,5</td>
</tr>
<tr>
<td>Greece</td>
<td>7,5%</td>
<td>11,3%</td>
<td>34,0%</td>
<td>30,2%</td>
<td>17,0%</td>
<td>3,4</td>
</tr>
<tr>
<td>Hungary</td>
<td>1,8%</td>
<td>16,8%</td>
<td>43,4%</td>
<td>23,9%</td>
<td>14,2%</td>
<td>3,3</td>
</tr>
<tr>
<td>Italy</td>
<td>23,9%</td>
<td>22,5%</td>
<td>21,1%</td>
<td>21,1%</td>
<td>11,3%</td>
<td>2,7</td>
</tr>
</tbody>
</table>

Figure 31: How satisfied are you over the following aspects of your building – attractiveness and aesthetics

3.5.9 Satisfaction regarding different aspects in building – clean and well-maintained

<table>
<thead>
<tr>
<th>Clean and well-maintained</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q2 Country of residence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>3,4%</td>
<td>9,6%</td>
<td>21,2%</td>
<td>39,7%</td>
<td>26,0%</td>
<td>3,8</td>
</tr>
<tr>
<td>Hungary</td>
<td>4,3%</td>
<td>4,3%</td>
<td>33,0%</td>
<td>37,4%</td>
<td>20,9%</td>
<td>3,7</td>
</tr>
<tr>
<td>Spain</td>
<td>2,3%</td>
<td>9,8%</td>
<td>30,8%</td>
<td>36,8%</td>
<td>20,3%</td>
<td>3,6</td>
</tr>
</tbody>
</table>
### Clean and well-maintained

<table>
<thead>
<tr>
<th>Country</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>3,4</td>
<td>9,6</td>
<td>21,2</td>
<td>39,7</td>
<td>26,0</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>4,3</td>
<td>33,0</td>
<td>37,4</td>
<td>20,9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>2,3</td>
<td>9,8</td>
<td>30,8</td>
<td>36,8</td>
<td>20,3</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>5,6</td>
<td>11,1</td>
<td>33,3</td>
<td>35,2</td>
<td>14,8</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>30,6</td>
<td>26,4</td>
<td>19,4</td>
<td>15,3</td>
<td>8,3</td>
<td></td>
</tr>
</tbody>
</table>

Figure 32: How satisfied are you over the following aspects of your building – clean and well-maintained

### 3.5.10 Satisfaction regarding different aspects in building – sense of security

<table>
<thead>
<tr>
<th>Q2 Country of residence</th>
<th>Sense of security</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 - Not satisfied</td>
</tr>
<tr>
<td>Row N %</td>
<td>Row N %</td>
</tr>
<tr>
<td>Hungary</td>
<td>.9%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>2,8%</td>
</tr>
<tr>
<td>Spain</td>
<td>2,6%</td>
</tr>
<tr>
<td>Greece</td>
<td>5,7%</td>
</tr>
<tr>
<td>Italy</td>
<td>15,5%</td>
</tr>
</tbody>
</table>

Figure 33: How satisfied are you over the following aspects of your building – sense of security
3.5.11 Satisfaction regarding different aspects in building – accessibility

<table>
<thead>
<tr>
<th>Accessibility (incl. for persons with disabilities)</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>9,0%</td>
<td>11,9%</td>
<td>25,1%</td>
<td>32,2%</td>
<td>21,9%</td>
<td>3,5</td>
</tr>
<tr>
<td>Hungary</td>
<td>40,2%</td>
<td>18,8%</td>
<td>21,4%</td>
<td>10,7%</td>
<td>8,9%</td>
<td>2,3</td>
</tr>
<tr>
<td>Slovenia</td>
<td>43,4%</td>
<td>20,7%</td>
<td>15,2%</td>
<td>13,1%</td>
<td>7,6%</td>
<td>2,2</td>
</tr>
<tr>
<td>Greece</td>
<td>50,0%</td>
<td>19,2%</td>
<td>11,5%</td>
<td>15,4%</td>
<td>3,8%</td>
<td>2,0</td>
</tr>
<tr>
<td>Italy</td>
<td>47,1%</td>
<td>26,5%</td>
<td>13,2%</td>
<td>5,9%</td>
<td>7,4%</td>
<td>2,0</td>
</tr>
</tbody>
</table>

![Accessibility chart]

Figure 34: How satisfied are you over the following aspects of your building – accessibility

3.5.12 Satisfaction regarding different aspects in building – energy efficient

<table>
<thead>
<tr>
<th>Energy efficient</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>2,8%</td>
<td>6,3%</td>
<td>26,4%</td>
<td>37,5%</td>
<td>27,1%</td>
<td>3,8</td>
</tr>
<tr>
<td>Hungary</td>
<td>8,0%</td>
<td>30,1%</td>
<td>30,1%</td>
<td>23,9%</td>
<td>8,0%</td>
<td>2,9</td>
</tr>
<tr>
<td>Spain</td>
<td>14,6%</td>
<td>27,6%</td>
<td>34,0%</td>
<td>17,0%</td>
<td>6,9%</td>
<td>2,7</td>
</tr>
<tr>
<td>Greece</td>
<td>20,4%</td>
<td>31,5%</td>
<td>25,9%</td>
<td>20,4%</td>
<td>1,9%</td>
<td>2,5</td>
</tr>
<tr>
<td>Italy</td>
<td>31,5%</td>
<td>30,1%</td>
<td>20,5%</td>
<td>13,7%</td>
<td>4,1%</td>
<td>2,3</td>
</tr>
</tbody>
</table>
### 3.5.13 Satisfaction regarding different aspects in building – environmentally friendly

<table>
<thead>
<tr>
<th>Q2 Country of residence</th>
<th>Environmentally friendly</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>5,0%</td>
<td>5,0%</td>
<td>30,9%</td>
<td>38,1%</td>
<td>20,9%</td>
<td>3,7</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>9,9%</td>
<td>20,3%</td>
<td>39,0%</td>
<td>22,2%</td>
<td>8,6%</td>
<td>3,0</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>7,0%</td>
<td>23,5%</td>
<td>42,6%</td>
<td>21,7%</td>
<td>5,2%</td>
<td>3,0</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>20,4%</td>
<td>20,4%</td>
<td>27,8%</td>
<td>24,1%</td>
<td>7,4%</td>
<td>2,8</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>19,7%</td>
<td>21,1%</td>
<td>38,0%</td>
<td>16,9%</td>
<td>4,2%</td>
<td>2,7</td>
<td></td>
</tr>
</tbody>
</table>

Figure 35: How satisfied are you over the following aspects of your building – energy efficient

### 3.5.14 Satisfaction regarding different aspects in building – noise levels

<table>
<thead>
<tr>
<th>Noise levels</th>
<th>1 - Not satisfied</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very satisfied</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>3,9%</td>
<td>6,8%</td>
<td>22,3%</td>
<td>37,9%</td>
<td>29,1%</td>
<td>3,8</td>
</tr>
<tr>
<td>Q2 Country of residence:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>Slovenia</td>
<td>Italy</td>
<td>Spain</td>
<td>Greece</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12,5%</td>
<td>14,3%</td>
<td>11,1%</td>
<td>13,0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14,0%</td>
<td>10,0%</td>
<td>19,8%</td>
<td>18,5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30,9%</td>
<td>22,9%</td>
<td>29,6%</td>
<td>31,5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28,7%</td>
<td>35,7%</td>
<td>24,3%</td>
<td>24,1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14,0%</td>
<td>17,1%</td>
<td>15,3%</td>
<td>13,0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Noise levels

![Noise levels chart](chart.png)

Table 17: Comparison among country samples – satisfaction over different aspects in building (1)

<table>
<thead>
<tr>
<th>Country</th>
<th>Attractiveness &amp; aesthetics</th>
<th>Clean and well-maintained</th>
<th>Sense of security</th>
<th>Accessibility</th>
<th>Energy efficient</th>
<th>Environmentally friendly</th>
<th>Noise levels</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>3,7</td>
<td>3,8</td>
<td>4,0</td>
<td>2,2</td>
<td>3,8</td>
<td>3,7</td>
<td>3,2</td>
<td>3,5</td>
</tr>
<tr>
<td>Italy</td>
<td>2,7</td>
<td>2,4</td>
<td>2,8</td>
<td>2,0</td>
<td>2,3</td>
<td>2,7</td>
<td>3,3</td>
<td>2,6</td>
</tr>
<tr>
<td>Greece</td>
<td>3,4</td>
<td>3,4</td>
<td>3,2</td>
<td>2,0</td>
<td>2,5</td>
<td>2,8</td>
<td>3,1</td>
<td>2,9</td>
</tr>
<tr>
<td>Hungary</td>
<td>3,3</td>
<td>3,7</td>
<td>4,3</td>
<td>2,3</td>
<td>2,9</td>
<td>3,0</td>
<td>3,8</td>
<td>3,3</td>
</tr>
<tr>
<td>Spain</td>
<td>3,5</td>
<td>3,6</td>
<td>3,6</td>
<td>3,5</td>
<td>2,7</td>
<td>3,0</td>
<td>3,1</td>
<td>3,3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,3</td>
<td>3,4</td>
<td>3,6</td>
<td>2,4</td>
<td>2,8</td>
<td>3</td>
<td>3,3</td>
<td></td>
</tr>
</tbody>
</table>

Table 17 demonstrates that the **sense of security** is an aspect that all country respondents favour the most, with the exception of Italy. In addition to security, the cleanliness and maintenance also reach relatively high satisfaction levels compared to other aspects. On the other hand, the **accessibility** is considered as an aspect that is least favoured in all participating countries. Next, energy efficiency and environmental friendliness are also reaching low satisfaction levels, with the exception of Slovenia. Next, case of Slovenia reaches the highest satisfaction levels compared to other countries when it comes to different aspects of the building (x=3,5). On the contrary, case of Italy reaches the lowest satisfaction levels (x=2,6), followed by Greece (x=2,9). The three areas that offer potentials for future improvements are accessibility, energy efficiency and environmental friendliness.

---

18 Table 17 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
Table 18: Comparison among country samples - satisfaction over different aspects in building (2)

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Slovenia</th>
<th>Italy</th>
<th>Greece</th>
<th>Hungary</th>
<th>Spain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Sense of security</td>
<td>1) Noise levels</td>
<td>1) Clean and well-maintained</td>
<td>1) Sense of security</td>
<td>1) Sense of security</td>
<td></td>
</tr>
<tr>
<td>2) Energy efficiency</td>
<td></td>
<td>2) Noise levels</td>
<td>2) Noise levels</td>
<td>2) Noise levels</td>
<td></td>
</tr>
<tr>
<td>3) Clean and well-maintained</td>
<td></td>
<td>3) Attractiveness &amp; aesthetics</td>
<td>3) Attractiveness &amp; aesthetics</td>
<td>3) Attractiveness &amp; aesthetics</td>
<td></td>
</tr>
<tr>
<td>4) Attractiveness &amp; aesthetics</td>
<td></td>
<td>4) Clean and well-maintained</td>
<td>4) Attractiveness &amp; aesthetics</td>
<td>4) Attractiveness &amp; aesthetics</td>
<td></td>
</tr>
<tr>
<td>5) Environmentally friendly</td>
<td></td>
<td>5) Attractiveness &amp; aesthetics</td>
<td>5) Attractiveness &amp; aesthetics</td>
<td>5) Attractiveness &amp; aesthetics</td>
<td></td>
</tr>
<tr>
<td>6) Noise levels</td>
<td></td>
<td>6) Attractiveness &amp; aesthetics</td>
<td>6) Attractiveness &amp; aesthetics</td>
<td>6) Attractiveness &amp; aesthetics</td>
<td></td>
</tr>
</tbody>
</table>

Table 19: Comparison among country samples - satisfaction over different aspects in home and building

<table>
<thead>
<tr>
<th>Aspects</th>
<th>Slovenia</th>
<th>Italy</th>
<th>Greece</th>
<th>Hungary</th>
<th>Spain</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>4,1</td>
<td>2,8</td>
<td>3,0</td>
<td>3,9</td>
<td>3,5</td>
<td>3,5</td>
</tr>
<tr>
<td>Air Quality</td>
<td>3,5</td>
<td>3,1</td>
<td>3,5</td>
<td>4,2</td>
<td>3,7</td>
<td>3,6</td>
</tr>
<tr>
<td>Natural Illumination</td>
<td>3,9</td>
<td>3,5</td>
<td>4,2</td>
<td>4,5</td>
<td>4,3</td>
<td>4,1</td>
</tr>
<tr>
<td>Artificial Illumination</td>
<td>3,7</td>
<td>3,5</td>
<td>3,8</td>
<td>4,4</td>
<td>3,8</td>
<td>3,8</td>
</tr>
<tr>
<td>Humidity</td>
<td>3,7</td>
<td>2,8</td>
<td>3,1</td>
<td>4,0</td>
<td>3,6</td>
<td>3,4</td>
</tr>
<tr>
<td>Noise (home)</td>
<td>3,4</td>
<td>3,5</td>
<td>3,2</td>
<td>3,9</td>
<td>3,5</td>
<td>3,5</td>
</tr>
<tr>
<td>Attract. &amp; aesthetics</td>
<td>3,7</td>
<td>2,7</td>
<td>3,4</td>
<td>3,3</td>
<td>3,5</td>
<td>3,3</td>
</tr>
<tr>
<td>Clean and well-maintained</td>
<td>3,8</td>
<td>2,4</td>
<td>3,4</td>
<td>3,7</td>
<td>3,6</td>
<td>3,4</td>
</tr>
<tr>
<td>Sense of security</td>
<td>4,0</td>
<td>2,8</td>
<td>3,2</td>
<td>4,3</td>
<td>3,6</td>
<td>3,6</td>
</tr>
<tr>
<td>Accessibility</td>
<td>2,2</td>
<td>2,0</td>
<td>2,0</td>
<td>2,3</td>
<td>3,5</td>
<td>2,4</td>
</tr>
<tr>
<td>Energy efficient</td>
<td>3,8</td>
<td>2,3</td>
<td>2,5</td>
<td>2,9</td>
<td>2,7</td>
<td>2,8</td>
</tr>
<tr>
<td>Environmentally friendly</td>
<td>3,7</td>
<td>2,7</td>
<td>2,8</td>
<td>3,0</td>
<td>3,0</td>
<td>3</td>
</tr>
<tr>
<td>Noise levels</td>
<td>3,2</td>
<td>3,3</td>
<td>3,1</td>
<td>3,8</td>
<td>3,1</td>
<td>3,3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,6</td>
<td>2,9</td>
<td>3,2</td>
<td>3,7</td>
<td>3,5</td>
<td>3,5</td>
</tr>
</tbody>
</table>

Table 19 brings together the results measuring the satisfaction over different aspects in home, but also on building and broader surrounding levels. Comparing the countries, we can observe that in the case of Hungary the respondents are the most satisfied over different aspects (total mean=3,7 / together with 5 aspects reaching x≥4,0). In the case of Slovenia, we can also observe relatively high satisfaction with more equal distribution of means in majority reaching values between 3,1 ≤ x ≤ 4,0, with the exception of Temperature (x≥4,0) and Accessibility (x≤3,0). On the other hand, the Italians are the least satisfied (total mean=2,9 / together with 8 aspects reaching x≤3,0). Comparing the overall results, we can notice that respondents in all countries are mostly satisfied with natural illumination, artificial illumination and noise; however, they are least satisfied with accessibility, energy efficiency and environmental friendliness. As we can observe, people are more satisfied with their home environment and less with the building and surroundings.
3.6 Habits, usage of personal devices and equipment

3.6.1 Use of heater

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>18,7%</td>
<td>18,2%</td>
<td>28,5%</td>
<td>20,3%</td>
<td>14,4%</td>
</tr>
<tr>
<td>Greece</td>
<td>42,3%</td>
<td>17,3%</td>
<td>11,5%</td>
<td>11,5%</td>
<td>17,3%</td>
</tr>
<tr>
<td>Italy</td>
<td>58,0%</td>
<td>10,1%</td>
<td>13,0%</td>
<td>11,6%</td>
<td>7,2%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>65,7%</td>
<td>15,7%</td>
<td>8,6%</td>
<td>5,7%</td>
<td>4,3%</td>
</tr>
<tr>
<td>Hungary</td>
<td>81,4%</td>
<td>8,8%</td>
<td>6,2%</td>
<td>1,8%</td>
<td>1,8%</td>
</tr>
</tbody>
</table>

Figure 37: Use of heater

Figure 37 demonstrates that respondents in all observed countries do not frequently use the heater (1,1 ≤ x ≤ 3,0) with the exception of Spain where the levels of use are equally distributed. We can observe that in Hungary and Slovenia people never or very seldom use heaters.

3.6.2 Use of fan

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>20,6%</td>
<td>17,6%</td>
<td>30,9%</td>
<td>19,1%</td>
<td>11,8%</td>
</tr>
<tr>
<td>Greece</td>
<td>31,4%</td>
<td>15,7%</td>
<td>17,6%</td>
<td>9,8%</td>
<td>25,5%</td>
</tr>
<tr>
<td>Spain</td>
<td>30,5%</td>
<td>19,9%</td>
<td>26,4%</td>
<td>14,7%</td>
<td>8,4%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>40,0%</td>
<td>20,0%</td>
<td>22,3%</td>
<td>10,8%</td>
<td>6,9%</td>
</tr>
<tr>
<td>Hungary</td>
<td>59,3%</td>
<td>19,5%</td>
<td>12,4%</td>
<td>5,3%</td>
<td>3,5%</td>
</tr>
</tbody>
</table>
Figure 38: Use of fan

Figure 38 demonstrates that respondents in the majority of observed countries do not frequently use the fan ($1,1 \leq x \leq 3,0$) with the exception of Italy (normal distribution) and Greece (with 2 peaks, i.e. people that never use it and people that very often use it). Comparing to heaters we can again observe that in Hungary and Slovenia people relatively rarely use fans.

3.6.3 Use of humidity control devices

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>1 - Never</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very often</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>50,7%</td>
<td>18,3%</td>
<td>11,3%</td>
<td>8,5%</td>
<td>11,3%</td>
<td>2,1</td>
</tr>
<tr>
<td>Hungary</td>
<td>54,5%</td>
<td>15,2%</td>
<td>17,0%</td>
<td>9,8%</td>
<td>3,6%</td>
<td>1,9</td>
</tr>
<tr>
<td>Greece</td>
<td>56,0%</td>
<td>16,0%</td>
<td>16,0%</td>
<td>8,0%</td>
<td>4,0%</td>
<td>1,9</td>
</tr>
<tr>
<td>Slovenia</td>
<td>61,2%</td>
<td>14,9%</td>
<td>13,4%</td>
<td>6,0%</td>
<td>4,5%</td>
<td>1,8</td>
</tr>
<tr>
<td>Spain</td>
<td>71,1%</td>
<td>12,9%</td>
<td>9,0%</td>
<td>3,6%</td>
<td>3,4%</td>
<td>1,6</td>
</tr>
</tbody>
</table>

Figure 39: Use of humidity control devices

Figure 39 demonstrates that the majority of all respondents in observed countries do not or very seldomly use the humidity control devices ($1,1 \leq x \leq 3,0$).
3.6.4 Use of plug-in lamps

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>1 - Never</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very often</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hungary</td>
<td>3,7%</td>
<td>22,9%</td>
<td>37,6%</td>
<td>23,9%</td>
<td>11,9%</td>
<td>3,2</td>
</tr>
<tr>
<td>Spain</td>
<td>19,8%</td>
<td>18,7%</td>
<td>26,1%</td>
<td>18,4%</td>
<td>17,0%</td>
<td>2,9</td>
</tr>
<tr>
<td>Greece</td>
<td>20,0%</td>
<td>22,0%</td>
<td>26,0%</td>
<td>10,0%</td>
<td>22,0%</td>
<td>2,9</td>
</tr>
<tr>
<td>Slovenia</td>
<td>40,0%</td>
<td>14,6%</td>
<td>23,8%</td>
<td>13,1%</td>
<td>8,5%</td>
<td>2,4</td>
</tr>
<tr>
<td>Italy</td>
<td>48,5%</td>
<td>19,1%</td>
<td>19,1%</td>
<td>5,9%</td>
<td>7,4%</td>
<td>2,0</td>
</tr>
</tbody>
</table>

Figure 40: Use of plug-in lamps

Figure 40 demonstrates that the use of plug-in lamps is higher compared to other devices (e.g. fans, heaters, humidity control devices). In Hungary, Spain and Greece we can observe rather normal distribution of use. In the case of Slovenia and Italy there we identify lower use of plug-in lamps, especially with higher levels of respondents that never use them – compared to other countries.

3.6.5 Change of clothing

<table>
<thead>
<tr>
<th>Q2 Country of residence:</th>
<th>1 - Never</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 - Very often</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>8,3%</td>
<td>9,6%</td>
<td>24,3%</td>
<td>25,9%</td>
<td>31,8%</td>
<td>3,6</td>
</tr>
<tr>
<td>Greece</td>
<td>12,0%</td>
<td>14,0%</td>
<td>28,0%</td>
<td>16,0%</td>
<td>30,0%</td>
<td>3,4</td>
</tr>
<tr>
<td>Italy</td>
<td>11,4%</td>
<td>18,6%</td>
<td>20,0%</td>
<td>30,0%</td>
<td>20,0%</td>
<td>3,3</td>
</tr>
<tr>
<td>Slovenia</td>
<td>26,2%</td>
<td>23,4%</td>
<td>27,7%</td>
<td>10,6%</td>
<td>12,1%</td>
<td>2,6</td>
</tr>
<tr>
<td>Hungary</td>
<td>18,6%</td>
<td>30,1%</td>
<td>32,7%</td>
<td>14,2%</td>
<td>4,4%</td>
<td>2,6</td>
</tr>
</tbody>
</table>
Figure 41 demonstrates that people tend to change their clothing if feeling cold, especially in Spanish, Greek and Italian context. On the other hand, in Slovenian and Hungarian context we do not observe as much frequency for changing the clothes compared to other three observed countries.

Table 20: Comparison among country samples – habits, usage of personal devices and equipment (1)\textsuperscript{19}

<table>
<thead>
<tr>
<th>Country</th>
<th>Heater</th>
<th>Fan</th>
<th>Humidity control devices</th>
<th>Plug-in lamps</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>1,7</td>
<td>2,2</td>
<td>1,8</td>
<td>2,4</td>
<td>2,0</td>
</tr>
<tr>
<td>Italy</td>
<td>2,0</td>
<td>2,8</td>
<td>2,1</td>
<td>2,0</td>
<td>2,2</td>
</tr>
<tr>
<td>Greece</td>
<td>2,4</td>
<td>2,8</td>
<td>1,9</td>
<td>2,9</td>
<td>2,5</td>
</tr>
<tr>
<td>Hungary</td>
<td>1,3</td>
<td>1,7</td>
<td>1,9</td>
<td>3,2</td>
<td>2,0</td>
</tr>
<tr>
<td>Spain</td>
<td>2,9</td>
<td>2,5</td>
<td>1,6</td>
<td>2,9</td>
<td>2,5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,1</td>
<td>2,4</td>
<td>1,9</td>
<td>2,7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Change of clothing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>2,6</td>
</tr>
<tr>
<td>Italy</td>
<td>3,3</td>
</tr>
<tr>
<td>Greece</td>
<td>3,4</td>
</tr>
<tr>
<td>Hungary</td>
<td>2,6</td>
</tr>
<tr>
<td>Spain</td>
<td>3,6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3,1</td>
</tr>
</tbody>
</table>

Table 20 demonstrates that respondents in all countries relatively rarely use heaters and fans, with a minor exception of Spain that demonstrates a minor tendency towards using heaters ($x=2,9$) and Italy & Greece that demonstrate a minor tendency towards using fans ($x=2,8$) – compared to other countries. The humidity

\textsuperscript{19} Table 20 demonstrates the observed characteristics of the sample in a comparable way between participating countries also considering the majorities, mean distributions and relative distributions compared to other countries within sample. Table 9 is a simplification used for further interpretation and development of user groups as key objective of respective deliverable.
control devices are never or very rarely used in all observed countries. Plug-in lamps can be considered as device that is most frequently used compared to other devices and equipment.

### 3.7 Costs for electricity and heating

<table>
<thead>
<tr>
<th>Q2 Country of residence</th>
<th>How do you consider your cost for electricity and heating?</th>
<th>Row N %</th>
<th>Row N %</th>
<th>Row N %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>Fair</td>
<td>High</td>
<td>MEAN</td>
</tr>
<tr>
<td>Greece</td>
<td>3,6%</td>
<td>34,5%</td>
<td>61,8%</td>
<td>2,6</td>
</tr>
<tr>
<td>Italy</td>
<td>4,1%</td>
<td>35,1%</td>
<td>60,8%</td>
<td>2,6</td>
</tr>
<tr>
<td>Spain</td>
<td>7,1%</td>
<td>56,7%</td>
<td>36,2%</td>
<td>2,3</td>
</tr>
<tr>
<td>Slovenia</td>
<td>7,8%</td>
<td>72,1%</td>
<td>20,1%</td>
<td>2,1</td>
</tr>
<tr>
<td>Hungary</td>
<td>19,3%</td>
<td>57,9%</td>
<td>22,8%</td>
<td>2,0</td>
</tr>
</tbody>
</table>

Figure 42: How do you consider your cost for electricity and heating?

Figure 42 demonstrates that the great majority of respondents in Greece and Italy consider their costs for electricity and heating as high. In case of Spain, Slovenia and Hungary, the majority of respondents consider their electricity and heating costs as rather fair.

### 3.8 Informed about energy savings

<table>
<thead>
<tr>
<th>Q2 Country of residence</th>
<th>Are you informed about energy saving?</th>
<th>Row N %</th>
<th>Row N %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Row N %</td>
<td>Row N %</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>79,6%</td>
<td>20,4%</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>76,9%</td>
<td>23,1%</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>68,5%</td>
<td>31,5%</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>65,8%</td>
<td>34,2%</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>56,4%</td>
<td>43,6%</td>
<td></td>
</tr>
</tbody>
</table>
Figure 43: Are you informed about the energy savings?

Figure 43 demonstrates that in all case studies the respondents consider themselves to be quite informed about energy savings. In Slovenia (79.6%) and Spain (76.9%), the respondents mostly agree with the respective statement, followed by Italy (68.5%) and Hungary (65.8%). In Greece (56.4%) we can observe the lowest levels of agreement compared to other countries; however, the majority of respondents still consider themselves to be properly informed about how to save energy in their home or/and building.
4 TripleA-reno List of Topics

TripleA-Reno ethnographic research (Task 2.3 and 2.4) is goal oriented and has somewhat defined aims and deliverables. This, however, is not in coherence with the usual practice of ethnographic research. For ethnographers on the field – that is at the site planned for renovation – virtually everything has a potential to be relevant material for our analysis. Anthropologists observe the situation holistically and avoid focusing their analytical lens exclusively on particular elements. To the same extent, we have to be careful not to be carried into extremes of over-generalising the scope of interest and over-discussing particular topics with limited relevance.

The following list of topics is primarily a researcher’s tool for preparations before going on the field, and it is influenced by the results of the respective Deliverable 2.2. It covers a broad spectrum of information that we aim to gather with the ethnographic research. The first section is a short set of general contextual topics and questions related to the renovation projects. These are meant to be answered by the researcher himself using literature, internet, relevant documentation and other reliable resources. The answers can (and will) be complemented by data and information gathered on the field. The second section focuses on the interaction with informants. Most of it is focused on the building occupants. However, when interacting with other actors, such as individual representatives of the involved institutions, we prepared a corresponding set of questions to be considered as well. Finally, the need for mindfulness of the project’s key aspects – affordability, acceptability and attractiveness – is highlighted.

The topics and questions are – again – guidelines for the researcher, who should form his own set of questions for each individual interview depending on where, why, and who he will be talking to. As these are guidelines for semi-structured interviews, we also provide examples of “kick-off” questions that could serve the researcher to start a meaningful debate with their informants through which they will then gather the bulk of information they require.

4.1 The contexts

4.1.1 The building and its location

Points of interests related to the broad context of the project, including social, economic, geographical, historic and demographic factors.

- What do you know about the building planned for renovation?
  - When was it built?
  - Who built it and why/what for/for whom?
  - What materials did they use and why?
- How does the building fit in its surroundings?
  - How does it fit in the location?
  - How does it interact with social places? Consider bars, parks, streets, the neighbouring buildings.
  - Will the renovation in any way affect these neighbouring places? Long/short term? Positive/negative?
- How are geographic, historic, social and economic contexts of the location relevant to better understanding of the physical and social realities of the case you are researching?
4.1.2 The key actors

The following set of questions regards individuals and institutions involved in the renovation project. These can either promote or impede the project depending on their interests, actions, and level of involvement. Since an important goal of TripleA-reno project is to learn how to build – or empower the existing – communities of individuals and institutions that promote attractive, acceptable and affordable energy renovations, it is important to understand both the reasons for and against the renovation. You shall resort to this set of questions several times – before, during and after the project.

- Who and what is involved in the renovation project?
  o What are the factors (both human and non-human) and who are the actors within the process?
  o Who makes or (what) significantly influences the decisions?
- Who supports and promotes the renovation project?
  o Who is part of/being associated with this community of individuals and institutions?
  o Who is being left out – considered or rendered irrelevant?
  o What are the motives and interests behind their agenda?
  o Are there any patterns you can observe? Consider age, gender, social status, religion, political affiliations etc.
- Which individuals and institutions deny support of the renovation project or even obstruct it?
  o What are the motives and interests behind their agenda?
  o Are there any patterns you can observe? Consider age, gender, social status, religion, political affiliations etc.
- Think about the relations between different actors involved?
  o What defines them and how would you characterize them?
  o Can you observe any type of formal or informal hierarchies (power relations)?
  o How do they communicate – exchange information and opinions, seek common ground on relevant issues etc.? If they do not – why?
  o Are the relations personal, ideological, political or strictly business?
  o How do these relations reflect in the decision making processes?
- Think about the variety of relations between individuals or institutions and the building in renovation.
  o What characterizes them?
  o How do these relations differ? In what way is the occupant’s relation with the building different from that of a housing corporation or a building designer?

4.2 The informants

4.2.1 Occupants of the building

The following are short sets of questions on general topics. They are focused on interviews with building occupants regardless of their stance towards the renovation project. The questions focus predominantly on indoor environment qualities – thermal comfort, sound, air quality, and light.
● Topic – the building

Kick-off question: How did you end up living in this particular building?

- Why does the informant live in the particular house/flat?
- How do they perceive the neighbourhood/town/village in which they reside?
  o Consider air quality, proximity of nature, aesthetics, sound landscapes, the climate, convenience services etc.
- What are their likes and dislikes related to the building?
  o Consider its visual appearance, environment and outdoor conditions, neighbourhood, relations with neighbours etc.
  o What creates discomfort in the building?
  o What is not working and should be made better?
- How does the informant compare the building with other buildings in the surrounding area?
  o Are they better or worse?
  o How do they view possible cases of energy retrofitting in the vicinity of their home?

● Topic – the renovation

Kick-off question: Do you feel energy renovation of the building is relevant to you and your way of life?

- What does the interviewee understand by (deep) renovation?
  o Do they feel this is a relevant topic?
  o Is it being discussed much in social circles they are part of?
- Has the building experienced (deep) renovation in the last 5 years?
  o Who initiated the renovation process and why?
  o Does (or did) the person participate in the renovation process? How and why?
  o What were the key decision factors for renovation? Consider energy savings, financial savings, improving aesthetics / visual appearance, improving indoor quality, improving health and wellbeing etc.
  o What were the main barriers for renovation and why? Consider achieving common and jointly agreed decisions, legal, costs etc.
  o Examples of good and bad practices related to renovation process. What could be improved? What should be kept?
  o How would you describe collaboration process with different stakeholders involved in renovation? Consider collaboration with other residents, owners, housing corporation etc.
- Did they have meters implemented in their home as part of the renovation (or on other occasion)?
  o How do they comment on them – are they of any use, how do they use them etc.?

● Topic - IEQ

Kick-off question: Is your house/flat pleasant to live in? Does it change much throughout the year?

- Are the household members satisfied with indoor environment quality?
- How do they perceive the air quality? Does it vary significantly throughout the year?
- How do they perceive the temperature? How do they feel in summer, winter…?
- How do they perceive the acoustic qualities of their home? Is it an issue?
- Are they content by the (outside) looks of their home? What do they like most/least?
- Do they consider their home as healthy?
- What do they do to improve the indoor environment quality?
  - Have them provide concrete examples and possibly demonstrate them to you.
- What creates discomfort in their home / apartment? What is not working and should be made better?

**Topic – energy related management, investments, habits and practices**

Kick-off question: *Is it a lot of trouble to maintain your home and cover the bills? What do you do to make it better?*

- How do they manage the energy costs?
  - Consider heating, cooling, general electricity use etc.
  - Who manages the energy consumption?
  - What proportion of the household finances is spent on various types of energy consumption? How does it compare with other monthly/yearly expenses (telecommunications, water and waste management etc.)?
  - What are their daily management practices?
- Do they use energy savings technologies?
  - Consider thermostatic radiator valves, smart electricity/gas meter, indoor environment sensors, presence detection sensors, window sensors, room thermostat with clock timers, light switch with timers or daylight sensor etc.
  - Have them provide concrete examples of good and bad practices related to energy consumption in their household and possibly demonstrate them to you.

4.2.2 Other key informants

Other key informants, such as representatives of institutions and businesses, are likely to have a completely different view of the renovation projects. These will involve considerations of data and information from specific fields of expertise (building technology, regulations, building management business etc.). Some of the following questions might also be relevant for outside observers, such as neighbours of the building in renovation etc. When talking to them, consider thinking about what motivates them to promote (or hinder) the renovation projects.

- What responsibilities do they carry?
- How do they collaborate with other actors involved in the project?
- What kind of issues do they have to deal with in their line of work?
  - How do they tackle them?
  - Who or what could help them resolve these issues more efficiently?
  - Have them provide concrete examples of the issues they encounter in their work.
- Are they in contact with the occupants of the building which is planned for renovation?
- How does (or could) the prospective successful realisation of the specific project affect them or the institution they represent? How about its possible failure?
4.2.3 Highlighting the triple A – Reflections on deep renovation

One of the objectives of the TripleA-reno project is to raise consumer awareness when it comes to deep renovation practices in homes. This will be achieved by providing attractive personalized information on energy use, costs, indoor environment, health, and lifestyle. Therefore, you should be mindful of and interested in various aspects of the triple-A – attractiveness, acceptability and affordability – of energy renovation projects throughout your research. Think of the recurring mind-sets and ways of how your informants framed the energy renovations – consider time, disruptions of everyday life, finances etc?

- How do your informants view energy renovation of buildings? What makes it attractive for them?
- Which are possible aspects of the project that make it acceptable, or rather, unacceptable for the end users?
- What makes it (un)affordable for them?
5 Developing user profiles and life stories

The following sections describes profiles of building users that were developed based on Task 2.2 and also to some extent taking into account the preliminary ethnographic results from Task 2.3 and 2.4. In addition, TripleA-reno consortium partners have used several occasions to involve internal and external actors in the development process of the so called “life stories” describing their real or potential renovation journeys.

For instance, the International Social Housing Festival in Lyon provided a perfect landing spot for the first stop of the Roadshow of the Triple A-reno project\(^\text{20}\). This meeting provided an opportunity for the professionals present during the roadshow to play themselves with the story-telling approach. The Housing Europe staff animated this workshop session and gathered various stories about deep renovation challenges, local heroes and awards. Groups of participants were asked to use the story-telling canvas and imagine heroes, special powers and journeys. These stories from the workshop provide new content for the Triple A-reno gamification platform that will help people on their way towards deep renovation journeys. The storytelling canvas can be found in Appendix 4: Storytelling Canvas.

![Figure 44: Photos from the storytelling workshop (International Social Housing Festival in Lyon, 5 June 2019)](image-url)

---

\(^{20}\) The event, organized by Housing Europe on June 5 2019, informed participants about the aims of the project. During the event valuable inputs were gathered that will feed into the gamified platform. This roadshow-stop focused on the aim of fostering new people-centred models and decision support tools to increase the acceptance of deep renovations among residents. The participants (housing federations, housing providers, building professionals and consultants) learned about the way gamification methods are being used in the Triple A-reno and then learned about the power of storyboards and user journeys as a social approach to involve and activate residents.
5.1 User Profile Examples

The first section aims to portray the diversity of factors we have to consider when trying to understand relations between people and buildings. In the following paragraphs the profile descriptions are demonstrated. First paragraph shortly describes particular characteristics of each individual user profile. Some of these descriptions refer to households rather than its individual members. Second paragraph are simplified short contextual descriptions of real individuals who we met on the field during our research.

In Triple-A Reno we are interested in people’s perspective of indoor environment and their attitude towards the renovation of the building (affordability, attractiveness, acceptability). Our conclusions are based on a key assumption, that it is people who use energy rather the buildings as such. That does not mean that energy use is an exclusive function of individuals. We recognise that materials and technologies have a significant impact on the total energy use and can invoke specific patterns of energy use. Nonetheless, in our interpretation we intentionally focused on socio-cultural factors and variables rather than materials and technologies. We believe that these are just as (or more) important when considering both patterns of energy use in buildings and related processes of building renovation.

In real life, people do not perceive their environment solely or exclusively through the lens of financial and technical factors. Our relation with the environment we live in and buildings that we use is amorphous, complex and is constantly changing. We are more likely to think of the buildings we use firstly from perspectives of comfort, convenience and location rather than their technical qualities. We tend to create our opinions based on our emotional and physical experience of space rather than through reasoning.

As demonstrated in previous sections of D2.2, when thinking of an individual’s relation to a particular building we should consider their age, gender, social and financial status, their background knowledge and personal interests, their personal characters, attitudes, motivations, values, lifestyles and habits. Special attention should be given to their plans and visions for the future and whether or not they see themselves as temporary or long-term building user/occupant. We should also consider viewpoints that surpass the individual – relations between building users and relevant wider community, hierarchies of knowledge and power, ownership issues, relevant legislation, possible illegitimate business and management practices (corruption), socio-cultural standards and/or constraints etc.

In other words, to truly understand people’s attitudes towards buildings and the renovation of buildings we have to know as much as possible about the context. With respect to all factors stated above, within the same building we are likely to encounter individuals with divergent interests, perspectives of time, affordability, aesthetics, values etc. As a result, they are just as likely to have very different motivations and interests regarding building renovation. In the following descriptions, we simplified and generalized the complex variety of people’s everyday life we encountered in the field to offer a reference point to experts and developers in Triple-A Reno project when thinking about how to design their solutions for the people who will use them.

5.1.1 Single occupants

These are single occupant households. As with all of the following profiles, without considering the wider context, especially the ownership status of their housing unit, their age, income and future plans, it is very hard to make generalised conclusions. Practice showed that one of the key considerations with single occupants was their age. Younger interviewees were more likely to be renting a housing unit and considered
themselves temporary occupants. As a result, they were generally not interested in making big investments into making their home more energy efficient or comfortable. Interestingly the same attitude was observed with single occupants in their third age of life. The latter had often been living in the same housing unit for most of their lives. Besides not seeing much sense in investing in an apartment they are well used to, many pointed out that they are uncertain about how many years of life they are left with.

To illustrate Ana (80 year) is a widow who lives in a house together with her granddaughter’s family. She owns the property but has no interest whatsoever in renovating the building. Her pension and savings are too small for any major investment and she feels no need to change anything in the house in which she spent most of her life. She also refuses financial help and suggestions made by her granddaughter and sons. Her stance is that she is happy with the situation as it is and whatever happens to her house after she passes away is not her business. As long as she is able to do her gardening, baking and sewing, nothing should change.

5.1.2 Couples

In comparison with the single occupant households, double occupant households are often financially stronger (double income) and have a more defined vision of the future relation with their dwelling. Depending on the life stage and style, they are likely to be both interested and able to afford renovations and improvements. As with the single occupant households, age and lifestyle plays an important role.

Tim and Maria (32 and 35 years) are a couple. They live together with their dog in an apartment owned by Maria, a successful businesswoman. They just moved into a bigger apartment in an old house, primarily

because of its convenient location and lower noise levels in comparison with their previous apartment. Maria wanted to invest into renovation of the house but they did not have a chance to do it before they moved in because they were not able to find an agreement with the owners of the ground floor level. When they will be able to realise the renovation is not clear. They are both overly busy with work and a full renovation would be too big of a disruption of their everyday life. In addition, they also have to make an agreement with their neighbour. More than anything, they want the house to be comfortable and beautiful. Energy savings are secondary.


5.1.3 Families with children

These households are typically comprised of two adults between 20 and 50 years old adults with one or more children. The household would typically have a steady income, which varies extensively from case to case, and would have a long-term vision of staying in the same housing unit. Decisions for investments towards improvement of the quality of indoor environment would often be based on concerns of healthy and comfortable life of their children. Their motivation factor for renovation is often the benefit of their children/family – it rises the value and liveability of the property. Interestingly, pets and plants sometimes have the same effect on people’s reasoning about the quality of indoor environment and housing renovation as children.

Naja (46 years) is a mother of three children. She lives with her husband and two younger boys in an apartment in a block of flats. During the weeks she is often home alone. Her daughter stays in a student dormitory close to her university in a distant city and her husband works as a merchant and is often away from home several days at a time. Naja is very pleased with their apartment and has very few complaints.
regarding its indoor environmental qualities. In the winter she even enjoys having the heating system set to low temperatures when her daughter and husband are away. Nonetheless, she is one of the most enthusiastic members of an initiative in their block of flats for the realisation of the energy renovation. Naja has a well-paid office job and claims that potential financial savings for here do not make much of a difference. She is more concerned about several other households in her building, especially a single old widow, who have low income and struggle to pay for their bills every month.

![Illustration](https://www.pixabay.com)


### 5.1.4 Multiple occupants

Households with multiple occupants are not uncommon. These are housing units where individuals typically share most of the areas (kitchen, bathroom, hallways, basements etc.) except for their bedrooms. These are especially common among younger population – students and young adults – who are transitioning from one life stage into the other. Typically, these households would be rental households and tenants would see it as a temporary solution although more complex ownership schemes are not to be disregarded. As a result, occupants would not be interested in investing into costly renovations and improvements individually. That however is largely dependent on the type of multiple occupant dwelling and relations between owners and tenants. Some households function homogeneously as a community of individuals who share responsibilities. Others function as a random group of individuals who share the same roof by chance.

Billy (48 year) is a manual worker in a small wood-cutting cooperative. He is an ex-anarchist and climate activist and lives in a housing cooperative together with five other political activists. Their cooperative owns an old 19th century villa on the outskirts of a big city. The building has never been properly renovated and is therefore in a very bad state. The housing community tries their best to maintain the building but it would really need an extensive and costly renovation. Besides the financial limitations of the cooperative, renovation is under question also because of very busy and divergent lifestyles of individuals in the house. It would be very hard to find a perfect moment for the renovation of the building. In addition, they hardly agree on how to renovate the building. Billy argues against the idea of central heating system with wooden pellets
and new set of triple glazed PVC windows because he believes the existing wood burning stoves are the optimal solution for their situation. Many of his housemates do not want to argue with him because of his prominent position within the cooperative, abundance of technical knowledge and short-tempered character.


5.1.5 Absent landlord

In case of rental apartments in the private sector, the decision makers are the landlords which own the property. These are not interested in building renovation by default. Often, they could avoid long-term investments because of short-term speculation decisions. They are waiting for the right moment to sell the property or are waiting to renovate the property once one of their family members or children decide to move in. It is important to emphasize that their view of the renovation is less related with concerns about the quality of indoor environment and comfort, because they do not actually use the apartments. They tend to think and act primarily through financial terms. In this respect, the strongest incentive for the renovation is higher value of the property after renovation.

Fani (61 years) is single mother, a cleaner with low income and basic education. She lives in an apartment on the outskirts of the city, close to her work. Her children are officially still students but are not overly keen on finishing their education any time soon. Instead of studying, they enjoy the benefits of their student status (state subsidies and tax cuts) and occasionally work student types of jobs – bars, various types of manual work, promotions etc. Fani inherited a small studio apartment in a block of flats in the centre of the city. The block was been built in the 60s’ and has never been renovated properly. It has problems with dampness and is very poorly insulated. Fani rents it out to a student couple for a very affordable rent because she cannot
afford any major investments into the renovation of the apartment. She wanted to keep the apartment for one of her children when they would find a partner, finish their studies and start their own life. Recently, however, she started seriously considering selling it. An initiative for building renovation has started in the block of flats and some individual owners from the building started threatening her with lawsuits if she will not conform to the will of the majority.


5.1.6 The “local heroes”

With respect to Triple-A Reno goal to promote building renovation it is important to give special emphasis on potential local heroes. These individuals typically have both strong personal interest in the renovation of the building and the capacity to advocate for, promote or even lead the process of renovation on behalf of their households and/or community of supporters. To act as local heroes, they have to be willing and capable of committing actively to the promotion and success of the project. Usually they are equipped with skills and/or knowledge that enable them to push their agenda forward regardless of the obstacles they encounter on their way. Among others, these obstacles can be conflicts among different individuals involved in the process, legislative obstacles, financial impotence of involved stakeholders etc. Local heroes often function as the catalyst of the renovation process and bridge the gap between management, experts, planers and the building occupants. They can be unaware of their crucial role initially, and can be approached and motivated by an external actor like the municipality, the local tenants association or the public/social housing organization.
Janez (39 years) is a father of a 3-year-old child and owns a small gardening business. With his spouse, he lives in a 50-year-old block of flats, which has recently been renovated. In the context of the renovation, Janez played the role of a local hero. Together with his neighbour Franc, they managed to push the renovation of the block of flats through even though they encountered many obstacles – legislative issues, disagreements between owners and tenants, illegitimate business practices proposed by the housing manager etc. Janez was able and eager to learn all about the renovation – from the necessary legislative and technological procedures, to materials, financial planning etc. With Franc’s help, an expert on civil engineering and employee at the local municipality, they managed to make their vision a reality within one year. Janez says he did not do it for the quality of the indoor environment or any financial speculation, but for the aesthetic appearance of the building. He claims that his motivation was primarily to make a difference, which is to say altruistic, rather than anything else.


5.1.7 The “antagonists”

Finally, for achieving the goal of promoting building renovation it is important to consider the role of the here called ‘antagonists’, those who will deny support of the renovation project or even obstruct it. Their motivations, interests and ways are varied, and often, assigning the antagonist label to someone will depend on the point of view: the antagonist is a role that can be played by all the other users’ profiles, usually presenting a conservative thinking.

Carmen and Rafael are a couple with three children, tenants of a social housing apartment for ten years due to their very low income. They blame the owner (public housing association) for the actual state of the
building and claim that all the improvements in their apartment have been done by themselves, (within their limited possibilities). A study of the building in order to evaluate its comfort and decide on future renovations is taking place, but they won’t collaborate without a clear personal benefit (this is the promise of fixing their own apartment). Since they feel the renovations choices are not theirs, and the better condition of their apartment is just on them, they won’t make any effort for a building renovation, and moreover, they won’t be careful with the rest of the building and its maintenance. (On the other hand, they’ll do whatever you ask if they see that the owner is fixing something - how they use it later is another story, since long-term plans are not into their scope).

In the same building, from the opposite point of view, the owner (the public housing association) is reluctant to invest on the building, since public budget is limited, building stock to be managed is huge, and occupants won’t use it properly. Therefore, they’ll do the very minimum renovations for legally complying, being the energy efficiency (specially nZEB objectives) far from their scope.

* Picture is for illustration purpose only. Retrieved from images.app.goo.gl.
5.2 Stories and Platform Functionalities

The following section elaborates on previous general user profiles with providing different stories and concrete recommendations for platform functionalities. The profiles are written in a form of “life stories” following the Campbell’s hero’s journey narrative patterns\(^2\).

5.2.1 Gunther and Sabine

Gunther and Sabine are a German couple in their late 50ies. Gunther is a baker and his wife Sabine is a nurse in a public hospital. They have 2 kids, but both left for university. Both work hard but they are slowly getting tired and they hope to be able to take a well-deserved in 5 to 10 years (Gunther might work a bit longer). Since Gunther’s pension will be rather low, they will mostly depend on Sabine’s one. Thanks to the money they managed to put aside all their working life, they bought their house in the small Bayern village where Gunther has is bakery in the beginning of the 80ies. Later on, in the late 90ies, when they had more or less finished to pay their entire entire mortgage back, they could afford to buy a small apartment and then a second one ten years later in the same multi-apartment building in the near city of Bamberg. They of course took a loan for this, but since the apartments were small and Gunther and Sabine never really had the time to get proper holidays, these are also more or less paid of now. Gunther is good at DIY, so they had renovated these apartments to the 80-90ies taste. But now they would need to fresh them up a bit because they realised that they are getting harder to rent (at least one of them, the other one is rented to a single man for years).

He is also considering changing the old water boiler and the windows, because the previous tenants complained of some draughts coming from one of the window. Yet he will have to check with the co-owners and see if it is possible. Maybe, since the two apartments are next to each other, he will also change the boiler and the windows in the other one. But he hopes that the tenant will accept to increase a bit the rent. He read somewhere that in Germany he can pass some of the renovation costs to your tenant, but he is not sure how it works. Well he might ask his local Haus und Grund club. They are always helpful with these questions. He will go there. Actually he has no time so Sabine will go.

The Haus und Grund legal advisor answered her questions: to change the windows, you need agreement of the co-owners indeed, yet to increase the rent you can do it by law: 8% of the modernisation cost can be passed on to the tenants as the regulation changed recently. Yet the advisor tells her to be careful, these rent increase lead to a lot of disputes. Yet, the new law simplified the scheme a bit for small landlords. Before they had to prove and separate carefully modernisation costs and the rest of the renovation costs (e.g. maintenance). Very difficult! Now they can calculate a flat rate of the whole renovation that can be considered as renovation costs and then calculate 8% of it. So to assess how much they could invest, it would be nice to have an idea of the rent increase possible, so to have an idea of the total renovation cost.

The lady from Haus und Grund told him that there is a website/platform that can help her to do so and assess all options. The Haus und Grund lady is kind enough to show her this platform. With the standard information she has she can already do a quick simulation for her, show her how an average boiler will cost them, with installation costs also. And also for the windows. The platform is also able to tell them if and which type of fiscal rebate, incentives and loans option they could get from KfW. Of course these are only rough estimation, but Sabine can leave Haus und Grund with a better feeling!

At home she shows the website to Gunther. They are not good with all these internet things, but they manage emails, pay their bills online and Skype with their kids who study and come back home only at weekend. Gunther finds the website interesting. He likes the idea to be able to simulate different things without any commitment or necessity to disclose all kind of information to a public body. You never know what they can do with your data. Oh! It seems that there is an incentive in Bayern to change the boilers. This was also mentioned by the lady from Haus und Grund, Sabine wrote it down somewhere. But they can see it again on the platform. They could save some few hundreds euros. Sitting around the kitchen table that evening they do not have much to do, so why not looking at what they could do with their house. It was built in the 60ies, and it could do with some improvement too. Gunther start to play around on the platform. Actually it is quite easy to use, not much more complicated than Skype and with some basic information about the house, the type of heating they use, etc., it can give them an idea of what they have to do.


5.2.2 Patrick and Martine

Patrick and his wife Martine live in Brussels, but he owns a small semi-detached house in Wallonia. Actually, he just inherited it from his grand-mother recently. He would like to rent it out, but it would first need to be completely renovated. He will contact some contractors in the area. But he doesn’t really trust contractors and where to find one?

He could ask around, but he didn’t grow in the area where his grandmother is from. So he doesn’t’ no any contractors or architects there. Or has no friends that could recommend someone. Patrick has not much to do today in his office, so he starts surfing the internet to look for contractors in Wallonia. He enters in google
“good contractor in Wallonia”. Results are not very satisfying and how can he relies on them. He tries “how to renovate Wallonia” and scroll down on the google pages. He sees a link “independent tool to assess renovation options” and “how to best select your contractor”. This sounds promising! He clicks on the link.

It seems to be something financed by the EU, so it should be reliable and neutral, right? At least it is not one specific company doing some marketing. The site is also pleasant and very modern, with easy to understand section and icons. Here he can choose your country. He clicks on Belgium. Cool there is a simulation tool. It promises you to also give you advice on planning permissions needed and on legal aspects linked to urbanism, rental and condominium law. Pfff! He is quite sceptical. Do these people know that in Belgium everything is much more complicated than anywhere else. That everything is regionalised. And when you call somewhere they always send you somewhere else. This is a Belgium sport. They always come up with an excuse: “This is not our competence! Call there” and when you call the other service, it is the same! So much energy lost! If only they could have un “guichet central”, a “one-stop-shop”.

Patrick concentrates himself back to this website. Oh! That’s a good start, you can choose between Wallonia, Brussels or Flanders region. He chooses Wallonia. He sees that they have a tool that can tell you how much energy you can save after a certain type of renovation or after a jump in the EPC scale and on top on that they calculate this in euros saved based on the average energy prices in Wallonia. How cool! This would be a great thing to show to the potential tenants, who might complain that your rent is too high compare to the neighbourhood similar kind of properties. Not only you will be able to explain them that it is because you have fully renovated, installed a new kitchen, etc. But you will also be able to show them how much they will save on their electricity bill.

What about the type of renovation you can do. Even cooler, you can choose different options, have some ideas of the average investment and on top of that you can visualised the type of renovation on simulation buildings in 3-D. How cool! He will show this to his friends!

Ok, all this is cool, but what about the contractor. Because in the end he still needs to find a contractor! Oh there is a section on “how to choose a contractor”. It gives you plenty of tips on how to make sure that the contractor is a reliable one, the number of quotes you should get. There is also a list of reliable websites (public ones mostly) that list contractors. On top of that, it advices you to do more serious simulation on the platform, with more detailed data about your house, the actual consumption (I wonder if I can find grandma bills), the local real estate market, local construction costs, the local energy prices, etc. With this kind of tool you can have an idea on how much a renovation could cost you. Of course they write that this is only indicative and that the price and solutions will vary greatly between the different offers you will get. But the advice given on the website is for you to keep this simulation(s) together with you, at least the part on the technical options, and discuss them openly with the contractor!

This is not a bad idea. Patrick enters his contact details and choose a password. There is list of things you have to gather to get a simulation as accurate as possible. In the coming days, he is going to gather all this information.

He has a good feeling, with this simulation, he will be able to have a slightly more informed discussion with your contractor. Like this he might be less incline to betray you.

Reassured, Patrick clicks on the box that brings you to the list of contractors. Cool one of them his a website that provides a peer to peer rating of contractor! Ok, you have to pay a bit, but it might be worth it.
5.2.3 Marlene’s story

Marlene moved to Rennes about 10 years ago for work. She decided to buy a small apartment (two bedrooms) pretty much in the city centre. Like this her parents and friends can visit her and the price in the city are ok. Plus, she got a good mortgage. She has a secure job in the bank where she got her mortgage. She likes her apartment, but she has quite a high energy bill. She likes to feel warm. But the building is not so well insulated. Actually, there would be substantial work to do in the building, including replacing the central heating. She mentioned this at the last general assembly. She also said she could ask in her bank to make a simulation for a loan. The other co-owners were not all there, but no one seemed interested and the condominium manager doesn’t seem to take the lead on this.

She heard at the bank about this website which can simulate renovation solution and give you advice on potential tax incentives. Maybe she could start it from there make a simulation and bring it to the next general assembly, maybe with an offer for a mortgage from her bank on top. This is slightly more concrete. It can show how much they can save on energy. But what about the landlords in the house? They are not interested about reduced utility bills. As a matter of fact, when you surf on the platform, you see that if you enter the local real estate prices and rental prices, you can see how much profit you could make on a renovated property.

On top of that, the platform gives you a couple of advices on how to present and make your case in condominium. Very cool. If she managed to get a greater interest from her co-owners for this project during the next general assembly, she might manage to convince them to get some quotes for the one after that. It
will take time! But one thing she learnt, is that you need to be patient when you want to do something in a condominium.

5.2.4 Story of a household

A household with 4 members that live in their own house which is a detached single-family house located in the suburbs of a north European city and it was built during 1960s. It is a bit old, energy inefficient and expensive to heat especially during the winter.

The owners that have some savings are considering to renovate it and they are interested to know more about the potential energy savings, without knowing at the moment what will be the amount that they have to invest and the amount that can potentially save in long term. They care mainly about the comfort and the aesthetical value of the renovation but the increasing oil prices impact the heating costs and that’s why they also consider making substantial improvements, including the replacement of the oil boiler. The house is located in a neighbourhood where the most of the buildings are listed and they don’t know if the current building legislation will allow for major improvements.

In the past, they had discussed potential improvements with some local contractors but the proposed solutions were very different in price and quality, something that made them more sceptical about the actual performance that these interventions can deliver. They then referred to the local property owners’ association for advice, where they informed them about the legal obligations that they first have to consider and they suggested them an One-stop shop online platform, through which many of their members had renovated their houses in the past and they were very satisfied about the price and the quality of the works.
Once they tried to use the platform they had access to some videos with tips on how to save energy at home and how to efficiently operate a heating boiler. A notification popped up suggesting that they have already completed the 20% of the free online courses and by completing the whole curriculum they would have access to discount coupons for energy efficient components like windows/boilers etc. in collaboration with local suppliers (the discount from the suppliers could be provided to the users of the platform as an exchange for promotional services).

Once they completed the interesting curriculum and accessed the discount, they should register in order to be able to use it. Once they are registered, they received a notification about their free access to the services that the platform provides. One of the services/tools is that they can insert more information about their house (upload floor plan, 3D pictures, location etc) and the platform will generate a virtual model of their house where they will be able to customize it according to their preferences.

Every time they make an improvement or change some components, the platform will generate automatically results that translate these improvements in comfort, energy savings and quality of indoor environment. Once they have concluded to the final design the platform will provide suggestions for extra energy efficient house or extra cheap to run or any other type of alternative scenario. Once they choose which one is better for them, the platform will ask from the registered contractors to provide detailed offers with costs breakdown and description of the works to take place……

They are very happy that they could have so many options to design the renovation from the beginning and that the platform offered them tailor-made and turnkey renovation solutions. But the most important thing is that by completing the renovation and giving feedback to the construction works and craftsmen, they got a lifetime access to the “home energy planner”, an online tool through which, they will be able to monitor in real time their energy consumption and compare the energy performance of the building before and after the renovation. They will definitely suggest them to their neighbours.

5.2.5 Mr Johan

Mr Johan is a landlord that owns a small, 4 floor multifamily building. The building is old and he has seen the price of the rent to go down year by year, since there are better, newer and cheaper apartments in the neighbourhood.

Mr Johan was considering to make some renovation and make the building attractive to the market again but he doesn’t know how he should start and he doesn’t trust much the local craftsmen. Also, he is afraid that the money that he considers to invest might be disproportionally high compared to the expected value increase after the improvements and it is rather preferable not to take any actions at all.

Angela, his nephew, is working as an architect at the city centre and recently suggested him to have a look at a new platform that promises to take you step-by-step to the renovation journey. Once he clicked the address on his browser he received an Invitation to participate in a quiz. The quiz prompted him to watch a video below. It was about a man at his age, having the same concerns and plans and showed how through the platform managed to identify profitable renovation solutions without really even moving from his armchair. When the video finished, he answered to some easy questions and he directly received a discount coupon on a local store/points to use in the platform/free property value estimation without even registering in the platform. He was impressed that by indicating his location, the age and surface of the building, the platform was able to estimate the potential increase of its value. He was amazed to see the results and he clicked on the “register here for a precise estimation”. He signed up in the platform, he provided more information and the platform made him a more precise revenue analysis.

Through the TripleA-reno platform he is able to access a network/market place of construction professionals that have been validated for the quality of the services they provide and the comparably attractive prices they offer. TripleA-reno platform promises to offer him tailor-made offers of energy renovations at the lowest price in the market, with estimations about the expected value increase of the house after renovation along with the available financing schemes in order to reduce his investment risks. Mr Johan is very curious to see how this platform could help him take informed decisions, but despite his amazement, the absence of a physical face to face interaction make him reluctant to give his full trust.

He is very impressed though that he will be able to check at any time the progress and quality of the construction, the current costs and will be able to choose online the materials and other parameters by communicating anytime with constructors and craftsmen either online or by phone. Also, he is impressed that the platform offers to send him weekly reports with the most interesting, clear and non-technical information about the progress of the construction, whenever this will take place.

Not very well known about his decisiveness skills, Mr Johan is satisfied with the flexibility that this platform provides him make him able to change his mind about the different components (windows, insulation, heating-cooling systems etc.) of the renovation even a week before the specific work takes place (replacement of windows). He is also happy that the platform promises to make precise estimations about the total construction costs and the expected property value after the renovation.

Before he submits the final request in the platform, he can still “play around” with the different elements/components and see how the price can change. Once, he decides to submit a final request, after a week, he will receive a precise estimation about costs and expected benefits.
His approval for a final submission generated a bid request to the constructors/suppliers, where they will be requested to make an offer within a week. Mr Johan’s request will be active on the platform for a month where suppliers can change their bids anytime. He thinks that in this way he can achieve cheaper requests and that’s why he will be checking the platform every week.

Apart from the overall benefits that the platform can offer to him, Mr Johan is happy that can receive trustful and reliable information. He feels confident using it because he knows that there is a single point of accountability. In case he wants to make questions or clarifications about the offer or the construction phase, he can visit his local engineering office which is accountable for creating, designing, executing and monitoring the offer and the construction works.

5.2.6 The Energy Games

The scene of this story is a social housing block with a high share of poor residents who have difficulties paying their energy bills. (“the real world”). Terry is the football trainer of the local children’s team (“the hero”). He notices that many families are not able to heat their homes and live in uncomfortable and even unhealthy situations. He wants to initiate a sort of competition to increase the energy efficiency in the homes through renovation works and by providing useful information to the residents (“call to adventure”). Terry starts to discuss his idea with several people around him and receives the help of the building manager who is aware of the situation and knows everyone in the building. (“the helper”). Our hero, the trainer, and his helper get to work and things are moving forward. However, there is also some resistance. One of the residents does not want to have any changes. He voices his concerns and tries to influence other neighbours to oppose the changes proposed. The local energy also seems reluctant to contribute to the technical
adaptation in the building (“the monsters”). The trainer and the building manager get access to a new tool. Via an online app they are able to organize the Energy Games. Through this initiative they invite residents to participants from the building to different types of virtual challenges based on disciplines and awards (“the special world”). Several of the solutions proposed by the app (smart meters, e-car sharing, daily energy behaviour changes) helps the residents to use energy in a more efficient way which increases their well-being and happiness. (“the result”). Another benefit is that the soccer club became more popular and gained members during this process.


5.2.7 Doctor Green

The neighbours in a street with semi-detached social dwellings have been discussing with each other how they can do a contribution to improving the environment while making their energy bills lower. They believe that their homes would benefit from the installation of solar panels on their roofs. However, they have no idea how this can be achieved (“the real world”). One of the residents, is a doctor working as general practitioner in the neighbourhood. He is a trusted figure with a large social network (“the hero”). He is convinced that the situation of the people living in his street, especially the most vulnerable ones, would benefit from the installation of an affordable and renewable energy source (“call to adventure”). At the same time, the doctor knows he needs helpers to achieve this and starts approaching the most enthusiastic neighbours. He invites them to become local ambassadors to gain wider support for this idea. The local ambassadors could also help in training people in optimizing their consumption of electricity, heating, water usage and cooling. (“the helpers”). Despite a few opponents that are afraid about the investment costs and the financial feasibility, the doctor and the ambassadors are able to convince everyone.
They contact the housing association that immediately likes the idea and will support the installation of solar panels and the financing through a special agreement with a local bank. After a few months, unexpected events occur. Not all the PV panels are functioning well. Some families do not receive the amount of renewable energy that they expected. They risk paying for the loan and for the tradition bill. In their situation this is a real problem (“the monsters”). The installation company is not reactive and, even after several contacts, the panels are still malfunctioning after a few months. Then the doctor and the residents decide to use the TripleA-reno platform through which the solar panel solution were selected. (“the special world”). They voice their concern there as well and some tenants start giving poor ratings to the installation company. Through the platform the company asks to send a picture of the installations. After receiving the picture, they notice a faulty connection of cable which is easily solutioned by their technician after a few days. The residents are finally able to fully benefit from the PV panels and even safe money at the end of the month. They achieved their goals of more affordable housing and a cleaner environment (“the result”).

5.2.8 Mother’s little helper

The neighbourhood where the social housing project is situated is an area that is in a derelict area that has not been modernized or maintained for too long. The public and green spaces are not attractive for families. The apartment blocks are in such a bad condition that is creates unhealthy and even dangerous situations for its inhabitants (“the real world”). Anita is a single mother with two children, although she is very busy
with her full-time job and raising her children, she miraculously finds the energy to come into action (“the hero”). She decides the situation is not bearable anymore and wants to stand up. She wants to make the housing situation healthier and the community more enjoyable for her, her kids and all her neighbours (“call to action”). One of her friends works at the social housing company and is willing to help her. After discussing the situation internally, the social housing company decides that it is time to intervene and look how to improve the situation (“the helper”). The necessary urban regeneration and energy efficiency improvements requires large investments. The municipality is not convinced about the needs and does not have the budget either. The EU does not allow the public authorities in this region to get more indebted, even for such cost-effective investments with clear social, health and environmental benefits (“the monsters”). The TripleA-reno platform provides an answer. It connects an ESCO, the residents, the housing association and the municipal department in this project. The ESCO will provide the financing through a PPP scheme. In parallel, the platform also offers a morphological image and an indication of improved energy, IEQ and well-being. Not only in the renovated apartments but in the whole area. People at the municipality and in the neighbourhood are more and more attracted to the project proposal done by the housing association (“the special world”). After 2 years of works in the community and of deep renovations, the image of the area completely changed. People have lower energy bills and children grow up in a healthier and more promising environment (“the treasure”). The sense of community and the quality of life in general are considerably better (“the result”). Anita, achieved her dream.

5.2.9  Tony from Naar

Tony is a tenant of an apartment in a five-storey building just outside of the centre of Naar, a post-industrial city somewhere in Europe. He works as taxi driver, often doing night shifts. His wife, Dolores, is a teacher at a nearby kindergarten. They have a two-year-old boy called Mario. (“the real world”). They recently received a letter informing them the whole building will undergo a major renovation. Although their rent will be raised, the social housing company promises the end-result will be fantastic and cost-neutral. Just as all the residents, they are invited to a meeting where the project and the planning of the works will be presented in more detail (“call to action”). Tony is worried and tells Dolores he will go to see how much disturbance this will cause and ask about the rent increase. He also wants to know about this TripleA-reno app-thing mentioned at the foot of the letter. “At worse I will enjoy some coffee and cake”, he tells here. “Surely Albert will be there as well.” They know Albert for many years. He recently retired from his job at the municipality and volunteered to coordinate the districts’ tenant association. (“the hero”) Albert is married and has some spare time.

Recently the housing association approached him. This will not be an ordinary renovation, the district manager told him. “It will be a Nearly Zero Energy Building”, the manager told him with great enthusiasm, as if the building was to become an interstellar spacecraft. They need improve the level of acceptance. At least 70% of the tenants need to agree. So, the social landlord will use a new app. The manager asks if he agrees to try it out and promote it under the other occupants. Albert is not convinced yet. He knows many of the residents already expressed their doubts about the need for such an ambitious project. He wants to make sure people are not going to pay more and that the disturbance is kept to a minimum. The social landlord already increased the rents recently. At the same time, some families complained about the mould, draughts and the cold temperatures in the apartments (“the monsters”).

At home, Albert installs the app on his phone with the personal code he received. The system automatically knows his name and the details about his apartment. Once he accepts the privacy terms, the app shows a short video. It is not what he expected. The video is about a game in which a hero needs to go on a quest and solve different challenges related to the different stages of the renovation. At the end of the video a message appears: “PRESS PLAY IF YOU ARE A TRUE HERO” (“the helper”). He enters the game (“the special world”). His first surprise is to see that a few neighbours have joined as well. That’s a relief. Albert is now presented with a few options: does he want to pick one of the next challenges? Some or single-player and other challenges are only possible to take on with a minimum of five co-tenants, which he can invite. Or does he want to see the profile of the companies and the people who will do the renovation? Does he want to find out how much costs he could be saving potentially after the total renovation? Apparently solving challenges increases the amount of savings and/or the satisfaction (which is indicated with a golden coin and a red heart). Or does he want to see the estimated weekly evolution of the works? He picks the last and is very pleased. (“the treasure”). The speed of the works and the new looks of the building are promising. He really needs to tell Tony to try the app at the upcoming meeting (“the result”).
6 Conclusion and further work

The key and overarching position of respective Deliverable 2.2 is that understanding people and their behaviours, attitudes, values, positions, motivational factors, relations with others etc. must play an important part in the broader field of energy research and that separate discipline lenses alone could not provide the complexity of knowledge needed for understanding and influencing human interactions with energy systems. Therefore, it aims to touch on and demonstrate the relevance and diversity of typical occupants and furthermore tries to categorize them in a generic way into several user profiles.

The TripleA-Reno ethnographic people-centred approach aims to enhance understanding of various aspects of human experience and social processes in their complex entirety and in “real-life” settings. It provides a tool for in-depth study of people and different human-based factors (e.g. habits, motivation, values, assumptions etc.) that influence decisions and the (un)willingness for deep energy renovations of residential buildings. In addition, the WP2 methodology aids to discover and describe the relations between building occupants and the building, as well as their relations and roles within the renovation processes. Summarizing key results from Deliverable 2.2 and combing them with deep ethnographic studies (Task 2.3 and 2.4) the project will propose several recommendations to enhance deep energy renovation.

One of the key aims of the TripleA-Reno project is to provide to building occupants attractive and personalized information on energy use, indoor environment, health and lifestyle and to furthermore enhance deep energy renovations of existing European housing stock. In the frame of the future Task 2.3 and Task 2.4 research work we are implementing the ethnographic methodology in demo cases across Europe, which all differ in relation to building and urban type, household structure, geography and other context specifics. In addition, we compare the qualitative results from ethnographic study with respective large-scale quantitative study involving broader sample of occupants from case studies. The objective is to analyse and translate the study results collected through inquiry and provide concrete recommendations, which will furthermore influence the co-creation of the TripleA-Reno solutions and TripleA-Reno gamified platform.
7 Appendix 1: PERSONAS Template

AGE (1-100):

GENDER (F, M, other):

OCCUPATION (job title, position):

PROVENIENCE (country & city):

INCOME (low, middle or high):

PERSONALITY (circle the number):
introvert
1 2 3 4 5 6
analytical
1 2 3 4 5 6
conservative
1 2 3 4 5 6
passive
1 2 3 4 5 6
extrovert
7
creative
7
liberal
7
active
7

BIO (describing the person, “goals” - what the person wants to achieve in life):

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):
Appendix 2: Transcriptions of personas

IOANA – Greece

AGE (1-100): 22
GENDER (F, M, other): F
OCCUPATION (job title, position): Student of architecture
PROVENIENCE (country & city): Arta
INCOME (low, middle or high): Low

PERSONALITY (circle the number):
introvert 2 3 4 5 extrovert 6 7
analytical 1 2 3 4 5 creative 6 7
conservative 1 2 3 4 5 liberal 6 7
passive 1 2 3 4 5 active 6 7

BIO (describing the person, “goals” - what the person wants to achieve in life):
Moved from Greek island, lives in village, want to become urban YUP. Architecture study – successful architect.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):
DISLIKES: living in community, low quality building

DESCRIBE HER/His HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)
Bad quality: noise, insulation, air quality
Difficult to cool, bad insulation

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):
Not caring very much about energy, open to technical improvements / smart homes / studying at night
sharing of appliances: washing machine, refrigerator / Using: PC, lightening
Juan – Spain

AGE (1-100): 38

GENDER (F, M, other): M

OCCUPATION (job title, position): Creative industry / architect

PROVENIENCE (country & city): Valencia, Spain

INCOME (low, middle or high): Mid-income

PERSONALITY (circle the number):
introvert
analytical
conservative
passive

extrovert
creative
liberal
active

1 2 3 4 5 6 7

BIO (describing the person, “goals” - what the person wants to achieve in life):
To have successful professional career. Raise a family of 2 kids. Had to close his consultant business.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):
Savings & aesthetics – motivation.
Legislation – barriers.

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):
He likes the building and dislikes relations with neighbors.

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)
He is very tidy. 2 young kinds – high expenditures (washing, energy)

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):
Washing machine, ventilation, Grandma lets kids watch TV all afternoons.
Empar – Spain

AGE (1-100): 28

GENDER (F, M, other): F

OCCUPATION (job title, position): School teacher

PROVENIENCE (country & city): Valencia, Spain

INCOME (low, middle or high): Low-Middle income

PERSONALITY (circle the number):

introvert 1 2 3 4 5 6 7

analytical 1 2 3 4 5 6 7

conservative 1 2 3 4 5 6 7

passive 1 2 3 4 5 6 7

extrovert 1 2 3 4 5 6 7

creative 1 2 3 4 5 6 7

liberal 1 2 3 4 5 6 7

active 1 2 3 4 5 6 7

BIO (describing the person, “goals” - what the person wants to achieve in life):

To improve people.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

Savings on energy – motivation.

Legislation – barriers.

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):

Neighborhood and relations with neighbors.

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)

She’s got a cat, not very clean.

Lots of friends visiting.

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):

She uses a lot of energy during nights.
A Lady without name – Spain

AGE (1-100): 55

GENDER (F, M, other): F

OCCUPATION (job title, position): Supermarket cashier

PROVENIENCE (country & city): Valencia, Spain

INCOME (low, middle or high): Low income

PERSONALITY (circle the number):
introvert 3 4 5 extrovert 6 7
analytical 2 3 4 5 creative 6 7
conservative 2 3 4 5 liberal 6 7
passive 2 3 4 5 active 6 7

BIO (describing the person, “goals” - what the person wants to achieve in life):

Daily goals. Doesn’t think about future perspectives.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

Energy savings. Community decisions.

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):

Visual appearance and aesthetics.

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)

Clean environment, low noise, no cooling / heating systems.

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.)

Ventilation.
Marika – Hungary

AGE (1-100): 70
GENDER (F, M, other): F
OCCUPATION (job title, position): Retired
PROVENIENCE (country & city): Hungary
INCOME (low, middle or high): Low income

PERSONALITY (circle the number):
introvert 3 4 5 extrovert 6 7
analytical 3 4 5 creative 6 7
conservative 3 4 5 liberal 6 7
passive 3 4 5 active 6 7

BIO (describing the person, “goals” - what the person wants to achieve in life):

To pay the bills at the end of month.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

Motivation: savings.
Barrier: investment costs.

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):

Like: neighborhood.
Dislike: High monthly costs, bad quality of building.

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)

Old technologies, old furniture.

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):

Open window when it is warm, close when it is cold.
Ventilation: using fan in summer when it is warm.
Istvan – Hungary

AGE (1-100): 50

GENDER (F, M, other): M

OCCUPATION (job title, position): Consultant

PROVENIENCE (country & city): Hungary

INCOME (low, middle or high): Middle income

PERSONALITY (circle the number):
introvert 1 2 3 4 5 extrovert 6 7
analytical 1 2 3 4 5 creative 6 7
conservative 1 2 3 4 5 liberal 6 7
passive 1 2 3 4 5 active 6 7

BIO (describing the person, “goals” - what the person wants to achieve in life):
Increase in salary. Win the lottery. To retire and get a better house.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)
Not warm enough during winter. Often has a sore throat.

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):
Thermostats. Does not ventilate properly to avoid heat loss. Leaves lights always on.
Marta – Hungary

AGE (1-100): 28

GENDER (F, M, other): F

OCCUPATION (job title, position): At home with 2 small children

PROVENIENCE (country & city): Budapest, Hungary

INCOME (low, middle or high): Low income

PERSONALITY (circle the number):
introvert 1 2 3 4 5 6 7
extrovert
analytical 1 2 3 4 5 6 7
creative
conservative 1 2 3 4 5 6 7
liberal
passive 1 2 3 4 5 6 7
active

BIO (describing the person, “goals” - what the person wants to achieve in life):
More money, move to bigger apartment.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):
Motivation: pay less for the apartment, better comfort.
Barriers: time, costs. In general, not so motivated for refurbishment.

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):
Like: neighborhood, relations with neighbors, people.
Dislike: high costs.

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)
In summer to warm, poor indoor quality. High bills.

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):
Open window for better IAQ. Switch on and off the lights.
Patrick – Netherlands

AGE (1-100): 30
GENDER (F, M, other): M
OCCUPATION (job title, position): Software developer
PROVENIENCE (country & city): Tilburg, Netherlands
INCOME (low, middle or high): Middle income

PERSONALITY (circle the number):
introvert 4 5 6 7
analytical 3 4 5 6 7
conservative 3 4 5 6 7
Passive (inside) 2 3 4 5 6 7
active (outside)

BIO (describing the person, “goals” - what the person wants to achieve in life):

No specific ambitions, to sustain his current condition. His dream is to do business with blockchain technology.

MOTIVATIONS / BARRIERS for renovation (savings, energy, aesthetics, environment, legislation, following community decisions etc.):

Wants a Built-in TV with Play Station. Wants a new garden where he would grow vegetables.

LIKES AND DISLIKES IN THE BUILDING (visual appearance and aesthetics, environment and outdoor conditions, neighborhood, relations with neighbors):

He is calm and polite and therefore respects what is expected from the society. Helps neighbors if they ask for help.

DESCRIBE HER/HIS HOME ENVIRONMENT (e.g. indoor quality, health & wellbeing, energy-related technologies)

He has stuffy air quite often – he forgets to ventilate and he spends all the time indoors playing videogames or programming. He likes to work everyday and often plays chess.

DAILY ENERGY-RELATED ACTIVITIES (e.g. ventilation, thermostats, using appliances etc.):

He always keeps T on 21 C, ventilates when air is too bad (when he comes home from work and realizes that air is stuffy). He normally keeps shades closed.
9 Appendix 3: TripleA-Reno questionnaire

1. Country of residence: ______________

2. Year of birth: ______________

3. Sex:
   □ Male
   □ Female
   □ Prefer not answer

4. Achieved education
   □ Primary school degree or less
   □ Vocational or professional school degree
   □ High School degree
   □ University degree or more
   □ Other __________

5. Number of people in the household
   □ 1
   □ 2
   □ 3
   □ 4 or more

6. Children below 10 years
   □ Yes
   □ No

7. Ownership status
   □ Homeowner
   □ Tenant
   □ Other __________

8. Building age
   □ Older than 1950
   □ 1951 – 1960
   □ 1961 - 1980
   □ 1981 – 2000
   □ 2001 – 2020
   □ Not sure

9. Is your building/flat currently in the process of renovation (envelope, windows, systems) or has been renovated in the last 10 years?

<table>
<thead>
<tr>
<th></th>
<th>Building</th>
<th>My flat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Envelope</td>
<td>□ Yes</td>
<td>□ No</td>
</tr>
<tr>
<td>Windows and/or doors</td>
<td>□ Yes</td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td>□ No</td>
<td>□ No</td>
</tr>
<tr>
<td>Installations</td>
<td>□ Yes</td>
<td>□ Yes</td>
</tr>
<tr>
<td>(heating,</td>
<td>□ No</td>
<td>□ No</td>
</tr>
<tr>
<td>cooling, ventilation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>□ Yes</td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td>□ No</td>
<td>□ No</td>
</tr>
</tbody>
</table>

10. If yes, what precisely:

11. Who initiated the renovation process of your building?
   □ Myself
   □ Neighbours/other individual owners in the building
   □ Landlord
   □ Building assembly
   □ Housing Company
   □ Other __________
   □ No renovation

   Please explain if needed:
   ___________________________________________________________

12. What were/are your personal key decision factors in favor of renovation?
   (1-not important / 5-very important)

<table>
<thead>
<tr>
<th>Decision Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial savings (e.g. lower energy bills)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improving esthetic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improving health, wellbeing and indoor environmental quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased value of the property after renovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment (e.g. renewable energy, reducing CO2 emissions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. What were/are the main barriers against renovation? 
   (1-not important / 5-very important)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achieving common and jointly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agreed decisions (in household,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>building etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal barriers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Would you consider your home a healthy environment at this moment? 
   □ Yes
   □ No
   Please, explain why:

15. How satisfied are you over the following aspects in your home? 
   (1-not satisfied / 5-very satisfied)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural illumination (sun)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artificial illumination (lights)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. How satisfied are you over the following aspects of your building (including exterior, public areas and direct surroundings)? 
   (1-not satisfied / 5-very satisfied)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attractiveness and aesthetics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean and well-maintained</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. How often do you use personal devices/special equipment/habits to feel more comfortable at home? 
   (1-never / 5-very often)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity control devices (dryer,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>humidifier etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug-in lamp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change your clothing (e.g. extra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sweater if feeling cold)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. How do you consider your costs for electricity and heating? 
   □ Low
   □ Fair
   □ High
   Please, explain why:

19. Are you informed about how to save energy in your home/building? 
   □ Yes
   □ No
   If yes, please list the some of the most effective actions to reduce energy consumption in your home/building