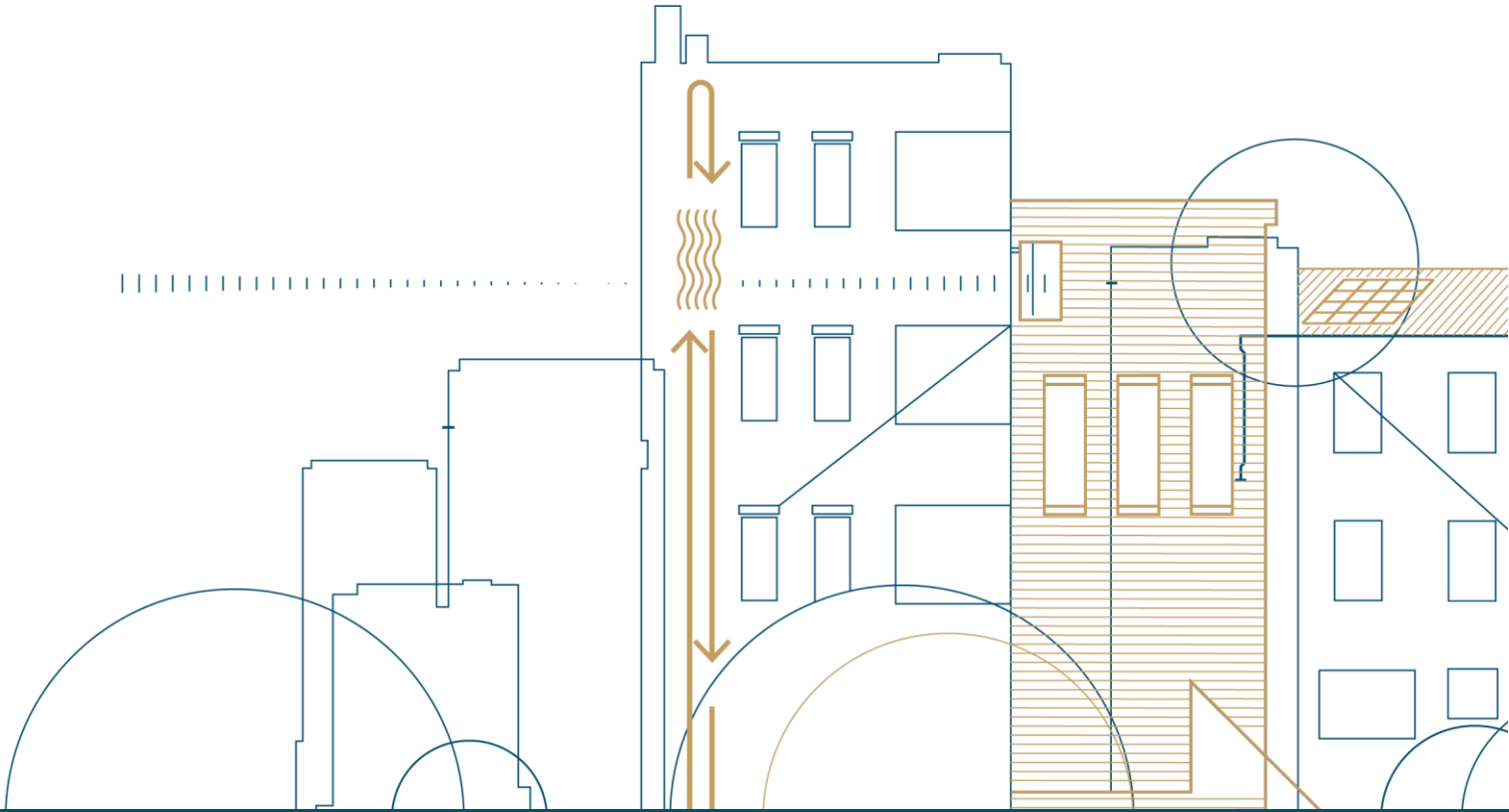# REHOUSE

D1.2

Social situation of the 4 local contexts

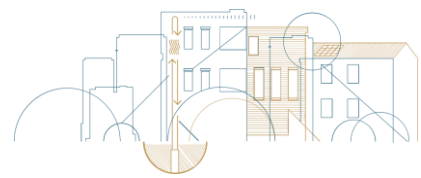| Project Acronym	REHOUSE
Project Title	Renovation packagEs for HOlistic improvement of EU's bUildingS Efficiency, maximizing RES generation and cost-effectiveness
Project Duration	1 October 2022 – 30 September 2026 (48 months)
GA Number	101079951

Work Package	WP1 – SOCIAL INNOVATION FOR PEOPLE-CENTRIC RENOVATION PROCESSES
Associated Task	Task 1.1 Social innovation activities and local social contexts
Deliverable Lead Partner	FCHURCH
Contributors	FCHURCH, CEA, TWR, DUTh, ENEA, ARCA, CARTIF
Author	Miklós Doleschall
Reviewer(s)	Voula Dimitriadou (DUTH), Anna Amato (ENEA), Monica Misceo (ENEA), Julia Vicente (CARTIF), Javier Antolín (CARTIF)
Dissemination Level	Dissemination Level Public (PU)
Type	Report
Version	V1.0
Status	Final version

Co-funded by the European Union

DOCUMENT HISTORY

VERSION	DATE	DESCRIPTION	AUTHOR(S)
V0.1	2023/06/02	ToC	Miklos Doleschall (FCHURCH)
V0.2	During June/July 2023	Contributions from demo-sites	FCHURCH, ENEA, ARCA, DUTH, CEA, TWR
V0.3	2023/07/24	First complete draft	Miklos Doleschall (FCHURCH)
V0.4	2023/07/25	Consolidated contents	Miklos Doleschall (FCHURCH)
V0.5	2023/07/28	Revised version	Javier Antolín, Julia Vicente (CARTIF)
V0.6	2023/07/28	Revised version	Anna Amato, Monica Misceo (ENEA)
V0.7	2023/07/29	Revised version	Voula Dimitriadou (DUTh)
V1.0	2023/07/30	Final version	Miklos Doleschall (FCHURCH)
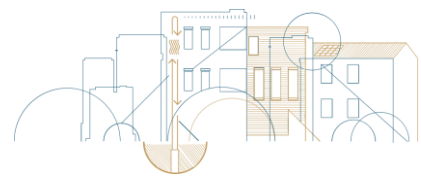
EXECUTIVE SUMMARY

This document is the final output of assessing the local context for social innovation in each of the REHOUSE demo sites. It assesses the level of energy awareness in detail and thoroughly discusses the issue of the risk of poverty. The body of the study presents the logical connections and the most significant results supporting them through tables and charts. For a precise interpretation of the results, methodological explanations are sometimes included. The appendix contains all the data from which the interpretation and conclusions are derived.

Despite the similarities, the characteristics of the regions of the four demo sites differ. The function of buildings awaiting renovation also differs, determining the demographic background and social position of the residents. Direct conclusions can be derived from the questionnaire, and broader conclusions can be drawn from the patterns appearing in the regional data. These factors and observations assign the starting point of social innovation and influence the activities for a higher acceptance of the project.

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LIST OF ABBREVATIONS

ACRONYM	DESCRIPTION
D	Deliverable
EC	European Commission
EU-SILC	EU statistics on income and living conditions
G7	Group of Seven largest advanced economies
GA	Grant Agreement
GDP	Gross Domestic Products
IPD	Integrated Project Delivery
KÖPPEN CC	Köppen Climate Classification
N/A	Non applicable
NTO	Non-Technological Objective
NUTS	Nomenclature of territorial units for statistics
STF	Social Task Force
STO	Scientific and Technological Objective
T, ST	Task, Subtask
TEPSIE	Theoretical, Empirical and Policy Foundations for Social Innovation in Europe
WP	Work Package

LIST OF PARTICIPIANTS SHORT NAMES

SHORT NAME	LEGAL NAME
ARCA	AGENZIA REGIONALE PER LA CASA E L'ABITARE
CARTIF	FUNDACION CARTIF
CEA	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
DUTh	DIMOKRITIO PANEPISTIMIO THRAKIS
ENEA	AGENZIA NAZIONALE PER LE NUOVE TECNOLOGIE, L'ENERGIA E LO SVILUPPO ECONOMICO SOSTENIBILE
FCHURCH	HIT GYULEKEZETE
TWR	TECHNIWOOD
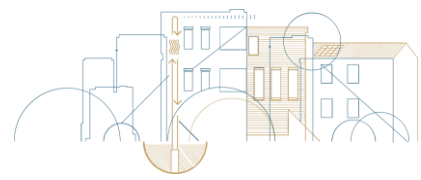
1   INTRODUCTION

The civil society plays a vital role in articulating social needs. The REHOUSE vision contains a paradigm shift as besides the innovative technologies, the new approach targets the development of local communities based on social and environmental, so-called societal needs and challenges.

Exploration of the social needs, demonstration of the technologies and explanation of the renovations as well lead to a high level of social acceptance of the innovations, moreover energy and environmental awareness.

Figure 1 Prerequisite actions for the social objectives
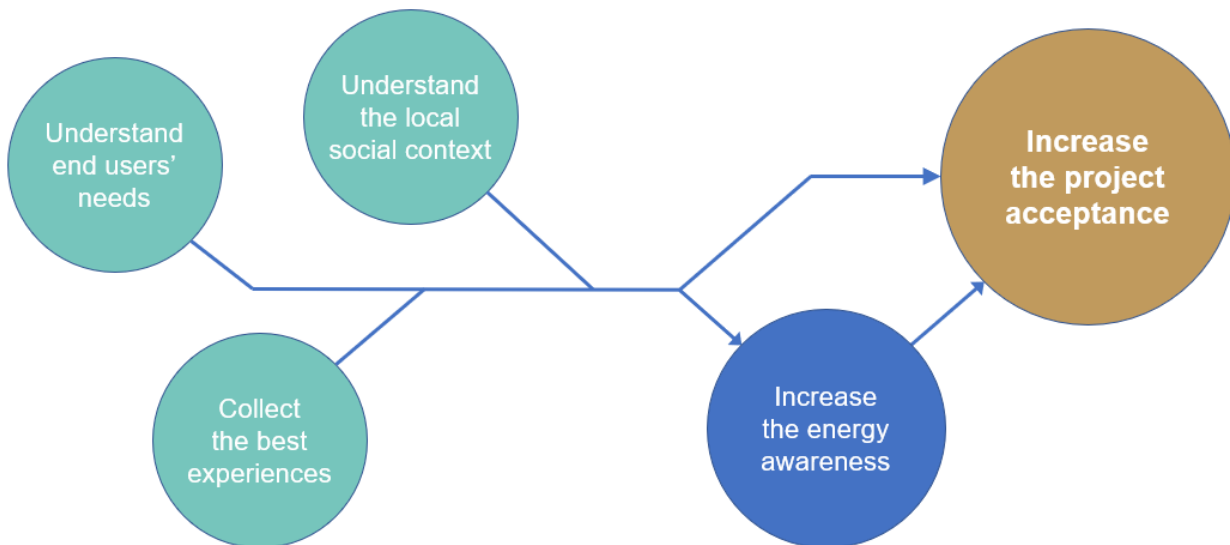
REHOUSE focuses on a people-centric approach to building renovation, as the project can be more successful if the technological activities fit the social context besides the environmental conditions. Therefore, besides the technical accomplishments, the implementation of the project requires social innovation which contains three components: (1) assessing the current social situation as the baseline of social innovation, (2) applying practical knowledge and existing experience of social innovation, and (3) mapping social needs to be satisfied as the aim of social innovation.

1.1   PURPOSE OF THE DOCUMENT

Among the three elements of social innovation mentioned above, the purpose of this document is to present the study of social and environmental as-is situations. The research aims to understand the local conditions of the society and the status of the residents, including the subjective perception of the demo buildings. Using different methods, questionnaires on perceptions, opinions, attitudes of end-users, collection of regional and national economic and social statistical records, and other desk research to understand the background of the collected information, the study deals with

- the characteristics of the demo sites,

- energy awareness of the end-users,

- demographical profile of the households,

- assessment of the risk of energy poverty,

- regional economic and social reference, and

- national drivers and barriers for the renovation solutions.

1.2   CONTRIBUTIONS OF PARTNERS

The help of demo site responsible members of the project including the local Social Task Forces (STFs) is significant in the completion of the questionnaire and providing background information to understand the local context. Besides the demo site responsible partners, the contribution of CARTIF was important in coordination.

Table 1 Contributions of partners

PARTICIPANT SHORT NAME	CONTRIBUTIONS
CARTIF	Coordination
CEA, TWR	Questionnaire, background information on French demo-site
DUTh	Questionnaire, background information on Greece demo-site
ENEA, ARCA	Questionnaire, background information on Italian demo-site
FCHURCH	Coordination and statistical records. Questionnaire, background information on Hungarian demo-site

1.3   RELATION TO OTHER ACTIVITIES IN THE PROJECT

The demonstration of the renovation packages carried out in the four demo buildings is part of the social innovation activity. The primary social goal is to involve users and owners in the detailed planning processes of the renovation packages emphasising the support of the STFs to secure the co-creation and co-design of the solutions. Furthermore, achieving a suitable change in habits and awareness is a secondary goal. The process of social innovation is defined in WP1, implemented and reported on in WP4.

Table 2 Relation to other Deliverables

ACTIVITY (DELIVERABLE NUMBER)	DESCRIPTION
D1.1	Analysis of Social innovation activities for retrofitting projects
D1.3	Report of Social requirements identified in the elicitation activities
D1.4	Design of social activities tailored to the local contexts
D4.6	Report of the social innovation activities launched in the 4 demos

The objective of the WP1 and the belonging tasks together serve the social innovation to be implemented in the four demo sites relying on three pillars:

- the current study of the local contexts on the demo sites (D1.2),
- existing social innovation experiences of the project members based on TEPSIE (D1.1),
- the assessment of the user's social needs and requirements (D1.3).

The objective of the WP4 is to introduce an integrated project implementation (IPD) methodology. The IPD stands in contrast to the traditional delivery model, where a company organizes and implements the investment using a top-down approach. Instead, the IPD promotes collaboration and communication between the various parties and seeks to accommodate grassroots needs or initiatives.
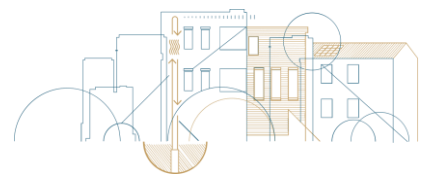
2 OBJECTIVES

2.1 PROJECT OBJECTIVES

The core objective of REHOUSE is to design and demonstrate in an operational environment innovative energy solutions. Two types of actors meet in the project, the technical partners in charge of the design and development of the technologies, so-called *renovation packages* and the organizations providing buildings, so-called *demo sites*. As the project members arrive on two lines, the project has two threads twisted together in the project: a technological and a social approach. This duality is also reflected in the division of the objectives into two groups:

- **STO** – *Scientific and Technological Objectives*
- **NTO** – *Non-Technological Objectives*

REHOUSE differs from traditional solutions not only in that in the innovative technologies during the renovations but also in that it pays attention to promoting social engagement to endow the renovation and increasing energy awareness. As the project threads are woven together, the ideas will be intertwined to each other.

In general, the objectives can be result-oriented or process-oriented. The two orientations are never sharply separated but we always apply a kind of their combination. The term result-oriented is used to describe the purpose of an organization or project that focuses on the outcome. The process-oriented approach focuses more on the values to be taken into account during the implementation of a project. We have to imagine it as a scale and our project and its objectives will be located between the two extreme values of this scale. Both STOs and NTOs may have more result-oriented or more process-oriented objectives.

2.2 SOCIAL OBJECTIVES

At the core of the renovation, the aim stands that renovation packages contribute to a better quality of living, a healthy indoor environment and the users' comfort. Affecting the residents and the building owners and maintainers, the interventions should be economic effective to reduce the energy and maintenance costs. In addition to the expected outcomes, countless methods are defined that must be applied from the design to the implementation of the project.

Table 3 Non-Technological Objectives

NTOs	DESCRIPTION
NTO#1	People-centric social engagement strategy
NTO#5	Novel business models
NTO#6	Market uptake, scalability and replicability
NTO#7	Dissemination and communication

The NTO#1 is not expressed as a result, but it is a procedural objective as a principle to be followed during the implementation. REHOUSE has to rely on a solid social basis. Efforts must be made to ensure that technical objectives meet social needs. In order to increase the renovations and technologies acceptance, the residents' and owners' perspectives should be taken into consideration in the project, the citizen-centric validation approach should be applied.

2.3   SOCIAL INNOVATION

The social innovation includes a bunch of activities involving stakeholders and representatives of civil society in the project to increase the users' energy awareness, demonstrate the technologies, and explain the purpose of the renovations integrating social needs and ideas. The concept and methods are an essential component of the Horizon Europe Research and Innovation Programme to solve and tackle many societal challenges. By definition, social development requires social acceptance. Accordingly, REHOUSE belonging to Horizon Europe, treats this expectation first among the social objectives.

'NTO#1: Implementing an inclusive people-centric social engagement strategy to endow the renovation wave with a resident and owner perspective towards affordability, satisfaction and attractiveness of sustainable renovation. Renovation packages design in line with the TEPSIE approach to include social innovation in technology projects by simultaneously meeting technical and social needs more effectively than existing solutions.'

REHOUSE Grant Agreement Annex – Description of the Action (Part B)
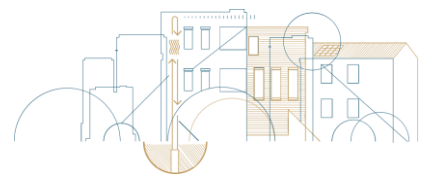
The abovementioned NTO#1 sets the expectation of applying the TEPSIE methodology for the people-centric social engagement strategy. As the name suggests, '*Theoretical, empirical and policy foundations for building social innovation in Europe*' is a merged definition of social innovation. It synthesizes numerous approaches following five criteria[1]:
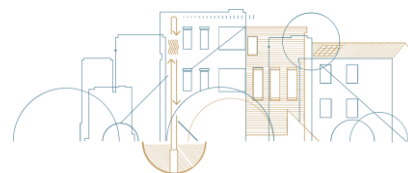
- *Social innovation is new to those involved in its implementation.*

- *Social needs are recognised, articulated, shaped and legitimised.*

- *Social ideas are put into practice.*

- *Beneficiaries and stakeholders are involved or engaged in the development of social innovation or its governance.*

- *Social relations are transformed by improving the access to power and resources of specific target groups.*

As mentioned among the criteria, the social engagement strategy should be tailored to the social context. The TEPSIE turns attention to the risk that using tools and approaches from different projects without due care and knowledge of local social contexts can cause more harm than good. A careful understanding of the social and environmental situation strengthens the process of social innovation and, ultimately, increases the acceptance and success of the project.

For a people-centric approach and the successful social engagement of the stakeholders and the end-users, the project members should understand the situation where the stakeholders live. We consider the local social context as the so-called zero point, where social activities will be started. During social innovation, the needs and ideas of the stakeholders should be identified. Meeting these expectations can lead to higher acceptance of the project. In other words, accurate knowledge of the local context is the baseline of social innovation, and it can be reached through statistical data collection, end-users survey and revealing background information.

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[1] **https://cordis.europa.eu/project/id/290771/reporting**

3   RESEARCH PLAN

The analysis of the local contexts reflects the current situation of the demo sites in two dimensions: the physical-technical living situation and the economic-social environment. The two aspects cannot be sharply separated. With few exceptions, housing conditions are strong indicators of the social status of the people living there. The research pays particular attention to the risk of energy poverty and the detection of its physical and social symptoms.

Table 4 Split of the analysis of the local context

TASK NUMBER	DESCRIPTION
ST1.1.2	Local social context – Social baseline
T4.2	Technical diagnosis – Building and energy systems baseline

People's experiences and observations are part of the technical diagnosis. The leaking roof, damp floor, and rot in window frames clearly indicate whether the building functionally does not work appropriately. These factors can have serious health consequences, and not only reflect the social situation. Besides the aim of energy modernization programs to reduce the environmental burden, an important goal of the renovation programs is to increase thermal comfort and air quality.

3.1   RESEARCH ACTIVITIES

Due to the obligation of EU member states to provide statistical data, quite a lot of data is available on the website of the European Statistical Office[2]. These data can be filtered based on geographical units and demographic or other statistical units. These records can be compared regionally, and they are also a reference point for data from the questionnaire to understand the social situation of the residents of the demo buildings. Interpretation is facilitated by the background information provided by the demo site responsible project members.

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[2] **EUROSTAT**
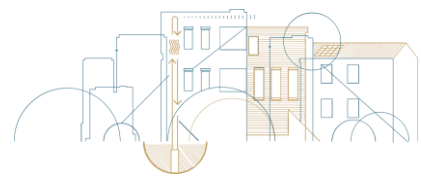
Figure 2 Research activities for understanding local social context
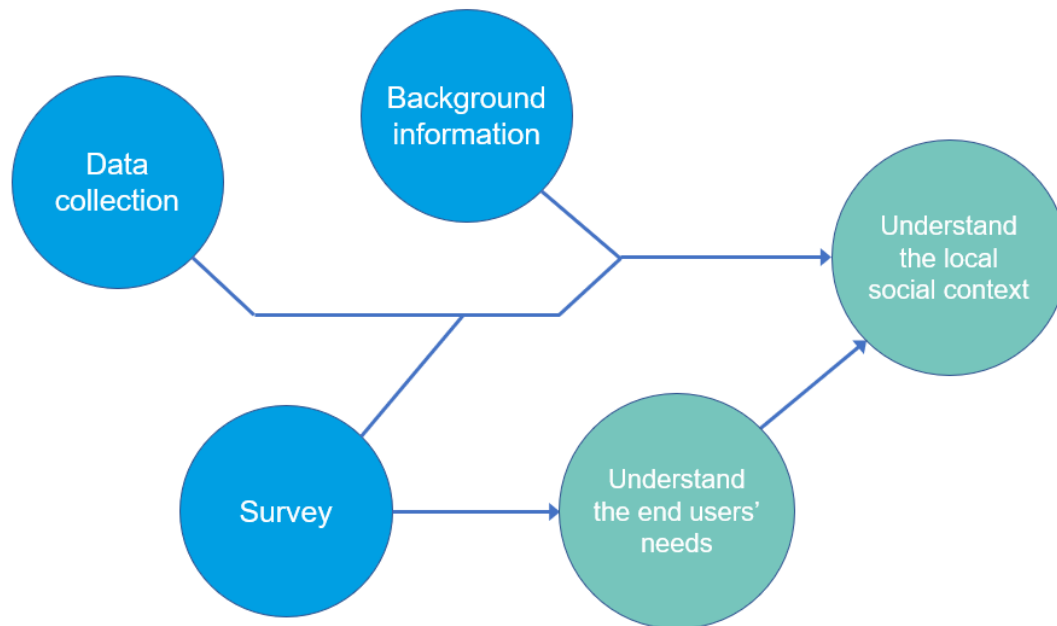
As the research focuses on the economic-social dimension of the local context, the primary research method of the analysis is the questionnaire with the end-users about energy awareness, subjective perceptions of the demo buildings, financial living situation, and demographical features.

3.1.1 DATA COLLECTION

The essential source to understand the national and regional characteristics is the official European statistical data retrieved by desk research. As the objective and missions of the Horizon Europe key funding programme emphasize the sustainable development and comfort of the dwelling, in the REHOUSE project, the collected data refer to demography, economic and financial situation, risk of poverty, and healthcare. In some cases, the records cover aggregated data. For comparability, they had to be brought to a common denominator such as per household, per employee, per employed hours or percentage of the population.
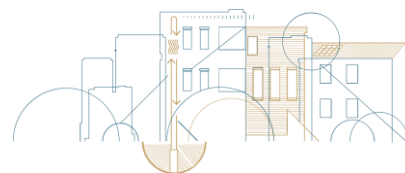
Table 5 Regional and national statistical category of social context

EUROSTAT CODE	DESCRIPTION
DEMO_R_D2JAN	Demography – Population
DEMO_R_PJANIND2	Demography – Median age of the population
HLTH_CD_ACDR2	Healthcare – Causes of death
HLTH_RS_PRSRG	Healthcare – Medical doctors
HLTH_RS_BDSRG	Healthcare – Hospital beds
HLTH_CO_HOSDAYT	Healthcare – Hospital days
HLTH_DP060	Healthcare – Disabilities
ILC_LVHL01	Healthcare – Self-defined health status
ILC_LVPH01	Demography – Size of Households
ILC_LI01	Poverty – Risk of poverty thresholds
ILC_LI23	Poverty – Risk of poverty of households
ILC_IW01	Poverty – Risk of poverty of employed people by ages
ILC_LI51	Poverty – Population in monetary poverty
ILC_LVPS08	Poverty – Youth population living their parents
ILC_MDSD01	Poverty – Material and social deprivation
ILC_MDES03	Poverty – Severe material and social deprivation
ILC_MDES01	Poverty – Inability to keep home adequately warm
ILC_MDES02	Poverty – Inability to afford paying for annual one week holiday
ILC_MDES03	Poverty – Inability to afford paying for meat or fish every second day
ILC_MDES04	Poverty – Inability to afford paying for unexpected financial expenses
LFST_HHNHWHTC	Demography – Number of Households
NAMA_10R_3EMPERS	Economy – Employment
NAMA_10R_2EMHRW	Economy – Employed hours
NAMA_10R_2GDP	Economy – GDP
NAMA_10R_2HHINC	Economy – Income of households by income types

For understanding the meaning of national and regional statistical data, we need discover backgrounds and contexts:

- concept of the social benefits,
- concept of the social benefits focusing on the energy situation and energy poverty,
- regulation and prices of the energy,
- personal income taxation concept,
- personal income taxation concept focusing on the minimum wage and people who lives on minimum wage
- social and living context of the students, the employed, the unemployed and the elder people.

3.1.2 QUESTIONNAIRE

The questionnaire is an essential part of the social research to gain information on the social context of the residents and on the residential building to be renovated in the REHOUSE project. The questions reflect the current situation, including the detection of energy poverty. Besides the social situation mapping, the survey tries to discover the subjective perception of the demo building and prepare the needs assessment, including the drivers and barriers for the solutions to be applied.

Table 6 Questionnaire category of social context

SECTION	DESCRIPTION
Energy awareness	energy-savings solutions, energy consumption, relative energy cost
Energy efficiency	satisfaction with equipment and energy service
Energy poverty	cover of expenses, financial difficulties
Demography	household records, education and employment status, age
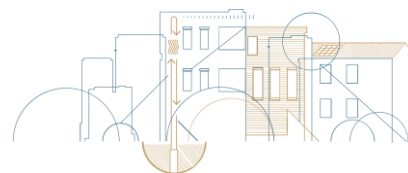
3.2   DEMO SITES

3.2.1   BUILDING TYPES

The demo sites represent the two edge age groups of adult society. The university students are focusing on their studies to build their existence; on the other side, the elder and most residents in social rental housing are past their careers. The two extreme groups offer an opportunity to compare the differences in attitudes and opinions that result from generational differences. From this point of view, it would have been good to see a group of people having actively part of the labour market with independent earnings in the research. In particular, valuable data could have been gained regarding market dissemination.

Table 7 Characteristics of the demo sites

DEMO SITE	TYPE OF RESIDENTIAL BUILDING
Hungary	Dormitory for university students
Greece	Dormitory for university students
Italy	Nursing home for elder
France	Social rental housing

3.2.2   GEOPOLITICAL ENTITIES

Geographical units, or so-called geopolitical entities, allow data to be compared between countries and regions. On the other hand, for the interpretation of the data from the demo sites, the national and regional average data will be reference points for results from the questionnaire.

Table 8 Geopolitical entities of the demo sites

DEMO SITE	TOWN / DISTRICT	NUTS 2 REGION	DEMO SITE LEADER
France	Saint-Dié-des-Vosges	FRF3 Lorraine	CEA
Greece	Kimmeria	EL51 Thraki	DUTh
Italy	Margherita di Savoia	ITF4 Puglia	ENEA
Hungary	Budapest, X. district	HU11 Budapest	FCHURCH

3.2.3   CLIMATE

Geographical differences between regions are also reflected in climatic conditions. The Köppen climate classification (Köppen CC) illustrates how different the locations are from one another. The oceanic climate is typical of France, the Mediterranean climate is dominant in demo sites near the sea in Greece and Italy, and Hungary belongs to the continental climate.

Table 9 Climates of the demo sites

DEMO SITE	KÖPPEN CC	TEMPERATURE [3]	PRECIPITATION
France[4]	*Cfb*	0-26 °C	636 mm on 112 days
Greece[5]	*Csa* bordering on *BSk*	2-32 °C	435 mm on 117 days
Italy[6]	*Csa* influenced by *Cfa*	5-29 °C	563 mm on 69 days
Hungary[7]	*Dfb* influenced by *Cfa*	−1-29 °C	532 mm on 84 days

The temperature indicator does not reflect the real challenges of an energy renovation project. The daytime peak and nighttime minimum temperature can be 10-15 degrees higher or lower. The extreme fluctuation of temperatures is caused by different climate effects influencing small regions of the demo sites. While in eastern France the cool ocean currents (*Cfb* in Köppen CC) bring rain and mild air throughout the year, the humid subtropical flow (*Cfa*) causes short-lived summer thunderstorms in the Mediterranean (*Csa*) and continental (*Dfb*) aridity. The temperature in the immediate coastal areas is moderated, but it can be increased by the effect of the semi-desert or steppe climate (*BSk*). Although the summer is hot and rainy in Hungary, the winter is cold and dry far from the sea and the ocean currents.

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[3] The temperature indicators show the lowest and highest values of the monthly average of the daily mean.
[4] **Strasbourg**
[5] **Thessaloniki**
[6] **Bari**
[7] **Budapest**
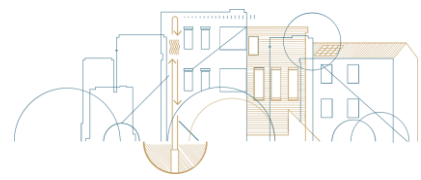
4   RESULTS AND INTERPRETATION

To understand the local context, including regional statistics and the questionnaire on the demo sites, in most cases, one of two metrics is used: the percentage or an arithmetic mean. Both metrics reflect reality, are informative, and facilitate comparison of different areas. However, both have essential features to keep in mind.

To interpret percentages, the meaning of the hundred per cent should be well-known. For example, employment can be measured by how many people have earnings compared to the entire population, or to working-age people. The average is similar. There are more options to choose a divisor number. For example, the average salary is measured by the employed people, while the GDP per capita is valid for all inhabitants. In this case, we would also be comparing two unrelated things.

Any arithmetic mean is a theoretical number. In reality, the items are positioned to the right or the left of the average. The metric does not tell us how far the cases are from it. If the researcher examines the number of computers per household, and the result

- in the first group, each household has a computer (1, 1, 1),
- in the second group, a household has many computer (3, 0, 0)

then it is clear that the two populations are different. In arithmetic, however, in both cases, the mean will be 1. In other words, an arithmetic mean does not reveal the inequality. In this case, the simple deviation – the average distance from the mean – is a more expressive value for comparing the two groups: 0 and 1.41.

4.1   REGIONAL CHARACTERISTICS

4.1.1   ECONOMY AND DEMOGRAPHY

As a starting point, Gross Domestic Product (GDP) can reflect the fundamental differences among the countries. France and Italy are members of the G7 countries, and the economies of Greece and Hungary are smaller. The total economic performance depends on the geographical size and population. Therefore, it is worth using the GDP per capita for comparisons.

It is worth looking at Europe as an economic fabric. The many small and large economic hubs are connected by threads. Depending on the strength of economic ties, this European economic fabric can be thicker in different places and thinner in others. To understand the position of a REHOUSE region in economic circumstances, the national averages can be useful reference points.

Table 10 GDP at current market prices per capita by country and NUTS 2 region in 2021 [8]

COUNTRY / NUTS 2	GDP PER CAPITA	RANK IN THE COUNTRY
France	36 964	
EU27	**32 489**	
Italy	30 084	
Lorraine	26 917	22nd of 22
Budapest + Pest	24 229	1st of 7
Puglia	18 212	18th of 21
Greece	17 013	
Hungary	15 801	
Thraki	11 998	12th of 13

euro

Territorial inequalities can be found in both large and medium-sized countries. The geographic location of the French, Greek and Italian demo sites is peripheral within the country. The economic power of that region is two-thirds of the national value. The situation of Budapest and Pest county is particular. The Hungarian capital and its agglomeration belonged to the same NUTS 2 region before. Despite the administrative separation, the two regions form an economic unit. As a regional hub, the GDP per capita in central Hungary is double the national average.

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[8] **NAMA_10R_2GDP** – see the entire table in Annex

Reviewing economic and demographic data together is helpful because it can explain each other. For example, in the thirteen European countries (not all EU member states) where the GDP per capita exceeds the EU27 average, the population is growing. In the weakest economies of the continent, the population is decreasing. The migration toward the more developed European countries is well-known. In addition, migrations within countries towards economic hubs are also typical.

Table 11 Population and growth rate by country and NUTS 2 region between 2018 and 2022 [9]
compared to GDP at current market prices per capita in 2021

COUNTRY	GROWTH RATE	GDP PER CAPITA
Attiki	+1.33%	22 953
France	+1.26%	36 964
Île de France	+0.95%	61 938
EU27	**+0.12%**	**32 489**
Budapest + Pest	+0.01%	24 229
Lorraine	−0.43%	26 917
Lombardia	−0.93%	40 388
Italy	−2.40%	30 084
Greece	−2.62%	17 013
Hungary	−0.91%	15 801
Puglia	−3.10%	18 212
Thraki	−6.71%	11 998

euro

The population change is a consequence of more types of geographic mobility. Movement within the country is always easier, as there are no language and cultural barriers. For example, the economic weight of the central Hungarian regions offset national emigration. The combined population of the two central regions is stagnant, even if the Hungarian population is decreasing. In the case of the other three REHOUSE regions far from the economic gravity centre, the population is decreasing faster than the national average rate or the richest region of the country.

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[9] **DEMO_R_D2JAN** – see the entire table in Annex

Europe is ageing. Italy has the oldest society in Europe, where the median − the middle element of the arithmetic series − age is 48.0 years; and the youngest for Iceland, where the median is 36.7 years. There can be several reasons for differences among the countries. It is much more important to see the trend. Apart from Germany, there is no European member country where the median age has not increased between 2018 and 2022. The ageing

- in the Western European and Scandinavian countries is between 0 and 0.5 years,

- in the post-communist countries, the typical value is between 0.5 and 1.5, while

- in the Mediterranean countries between 1.5 and 2 years.

Table 12 Change of median age by country and NUTS 2 region in 2018 and 2022 [10]
compared to population growth rate

COUNTRY / NUTS 2	MEDIAN AGE CHANGE	GROWTH RATE
France	+0.6	+1.26%
Lorraine	+0.6	−0.43%
Budapest + Pest	+1.1	+0.01%
Hungary	+1.3	−0.91%
Greece	+1.5	−2.62%
Italy	+1.7	−2.40%
Thraki	+1.8	−6.71%
Puglia	+2.1	−3.10%

The first two reasons for social ageing are demographical:

- decreasing the number of births and

- increasing life expectancy.

The third reason is economic migration. Where the working-age generation moves from, the ageing of society is faster there. This is the decisive reason that if a region lies further from the continental economic axes, it faces the risk of population decline.

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[10] **DEMO_R_PJANIND2** – see the entire table in Annex

Statistics often consider the 25-64 age group as the working-age population. In fact, where the life expectancy is higher, and the health status is better, the capacity to work probably does not end at 65 years old. Moreover, employment is a compulsion caused by the life situation. Taking a part-time or temporary job among university students has always been typical. Observing another aspect, not all working-age person is employed.
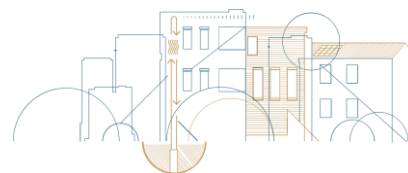
Table 13 Working-age population by country and NUTS 2 region in 2019 [11] compared to employment rate

COUNTRY / NUTS 2	25-64 YO	EMPLOYED
Budapest + Pest	56.1%	69.1%
Hungary	55.4%	48.2%
EU27	**54.0%**	**46.9%**
Greece	53.4%	44.3%
Italy	54.2%	42.6%
France	50.2%	42.4%
Thraki	52.1%	40.2%
Lorraine	51.1%	35.3%
Puglia	54.1%	34.9%

100% = all inhabitants

The proportion of working-age people in all areas falls between 50 and 56 percent. Although there is also no significant difference in the national employment level, the regional values are much wider on the scale, between 35 and 69 percent. In particular, the central Hungarian region is out of line. The proportion of employed people is one and a half times more than the EU average. Statistically, there are 1.62 million workers for 1.75 million Budapest residents because of the many commuting workers from surrounding areas.

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[11] **NAMA_10R_3EMPERS** and **DEMO_R_D2JAN** considering data before COVID-19 pandemic

The general assumption is that countries or regions with stronger economies have higher employment. As can be seen from the table below, this is not the case. The economic performance of the Hungarian central region and Lorraine is similar, but the difference in employment is double. In the cases of the other records, the employment rate does not reflect GDP values either.

Nowadays, economic performance results mainly from natural resources and financial capital. With the spread of automation, the significance of human resources is transformed. The quality becomes emphasized, while employment statistics reflect the quantity. There is no logical connection between the level of employment and GDP.

Table 14 Employment rate by country and NUTS 2 region in 2019 compared to GDP at current market prices per capita in 2021

COUNTRY / NUTS 2	EMPLOYED	GDP PER CAPITA
Budapest + Pest	69.1%	24 229
Hungary	48.2%	15 801
EU27	**46.9%**	**32 489**
Greece	44.3%	17 013
Italy	42.6%	30 084
France	42.4%	36 964
Thraki	40.2%	18 212
Lorraine	35.3%	26 917
Puglia	34.9%	11 998

100% = all inhabitants   *euro*

The level of employment depends somewhat on how far the area is from the economic axes. Employment is higher in financial hubs where the global service sector provides jobs, while opportunities and vacancies are less in peripheral regions. This inequality among regions can be statistically measured based on GDP per capita.

The inequality index is a deviation metric. The statistical values of regions are at different distances from the national average. The standard deviation is the most commonly used, but for a sample with a small number of elements, it is worth using the simple average distance determined as a percentage. If this value is low, the regions in the country are in a relatively balanced position.

Table 15 Inequality index by country in 2019 [12]

COUNTRY / NUTS 2	EMPLOYED	GDP PER CAPITA
France	3.5%	12.4%
Greece	3.9%	20.9%
Italy	5.8%	23.9%
Hungary	10.7%	27.8%

Although it is statistically valid that where the average is higher, the deviation among the items is likely to be higher, in practice the values of the four REHOUSE countries are contrary to the theory. The difference is significant. Regional inequality, both in employment and economic performance, is the lowest in France and the highest in low-income Hungary.

4.1.2   RISK OF POVERTY

The Eurostat uses so-called EU-SILC statistics to measure income and living conditions. Detailed data are collected on income components, including to reveal social exclusion. At the same time, information is obtained on housing, labour market, education and health conditions. As the research method is the questionnaire, it provides information on the balance of expectations and opportunities more than monetary values.

The definition of the risk of poverty or social exclusion refers to self-perception of the people, who

- receive disposable income,
- face severe material and social deprivation, and/or
- live in a household with very low work intensity.

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[12] calculated based on values by NUTS 2 regions – see the entire table in Annex

Although the assessments do not provide solid numerical data, they give a reliable picture of the situation of society. The reference population includes all private households. All household members are interviewed, who are aged 16 and over. As the volume of the questionnaires is limited, the results are not aggregated at the regional level, but only at the national level.

Table 16 Properties of EU-SILC research

PROPERTY	DESCRIPTION
Subject	Income and living conditions
Method	Interview and questionnaire
Reference unit	Households
Geopolitical entities	Countries

The income and living conditions statistics are measured at the household level. Each household can belong to several types based on multiple household taxonomies. In this study, two types are examined. The households with dependent children face the most expenses, they are more exposed to the risk of poverty. As the demo sites include university student dormitories and nursing homes for the elder, the single-person household is the other reference group. This reference point is purely theoretical because data is not collected in collective households and institutions by the EU-SILC research.

Large-scale questionnaire researches provide acceptedly reliable data on society. They are reasonably supposed to harmonize with other objective economic and employment statistics. In reality, however, this is only partially fulfilled. Above all, it is worth remembering that even GDP per capita and the employment rate do not correlate. On the other hand, the national values are only an average and do not exclude inequalities. Prosperity and wealth are not evenly distributed in a country. There can be poor people in a rich country, and social deprivation can be avoided in a backward region.

Table 17 Persistent at-risk-of-poverty in two types of households by country in 2019 [13]

COUNTRY	HOUSEHOLD W/ CHILDREN	SINGLE PERSON
Hungary	5.5%	9.8%
France	10.1%	9.5%
EU27	**11.6%**	**18.3%**
Greece	15.4%	10.5%
Italy	18.7%	17.8%

100% = all inhabitants

The values do not show a parallel with the actual economic performance of the countries, to the objective employment data or the index showing territorial inequalities. It is important to emphasize that the risk of poverty is the result of a self-reported survey. The values reflect the personal perception or balance of expectations and opportunities. The areas have different income levels with different price structures. Although certain products have a global price because they are accessed through a global supply chain, the expenses of basic needs, such as food and housing, vary widely across regions.

Uncovering the reason and factors of poverty and closely related social exclusion is difficult, but presenting with existential indicators can be easier. An indirect and detailed method of measuring poverty is the so-called 'inability' questions. During the interview, the respondents answer which of their needs they are unable to cover. This indicator can be considered objective as people know precisely what they can spend and what their wallet is not enough for.

Codes of expenses

- *WARM – inability to keep home adequately warm*
- *MEAT – inability to afford a meal with meat, fish (or veg. equivalent) every second day*
- *HOLIDAY – inability to afford paying for one-week annual holiday away from home*
- *EXTRA COST – inability to cover unexpected financial expenses*

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[13] **ILC_LI23**

*Table 18 Risk of poverty of **household with dependent children** by inability factors by country in 2019 [14]*

COUNTRY	WARM	MEAT	HOLIDAY	EXTRA COST
Hungary	5.5%	14.0%	43.3%	39.4%
France	6.1%	8.0%	22.6%	35.9%
EU27	**6.4%**	**7.7%**	**27.5%**	**32.1%**
Greece	17.4%	10.0%	48.9%	47.0%
Italy	10.0%	11.0%	40.0%	33.3%

100% = all households with dependent children

The records can be divided into two groups. Paying for a one-week holiday and covering the unexpected expenses, such as repairing a broken washing machine, is a problem for more people than providing a warm home or meat every second day. Covering the expenses is not just a financial issue. For example, a one-time repair cost is probably less than the heating bill annually, but a warm home is more important. And the appropriate nutrition precedes the one-week vacation. Concisely, the results of the factors can be seen as a sort of order. The data show convincing differences between countries.

Figure 3 Inability factors and poverty threshold of household with dependent children by country

— Persistent at-risk-of-poverty rate as poverty threshold | ● WARM | ● MEAT | ● EXTRA COST | ● HOLIDAY
100% = all households with dependent children

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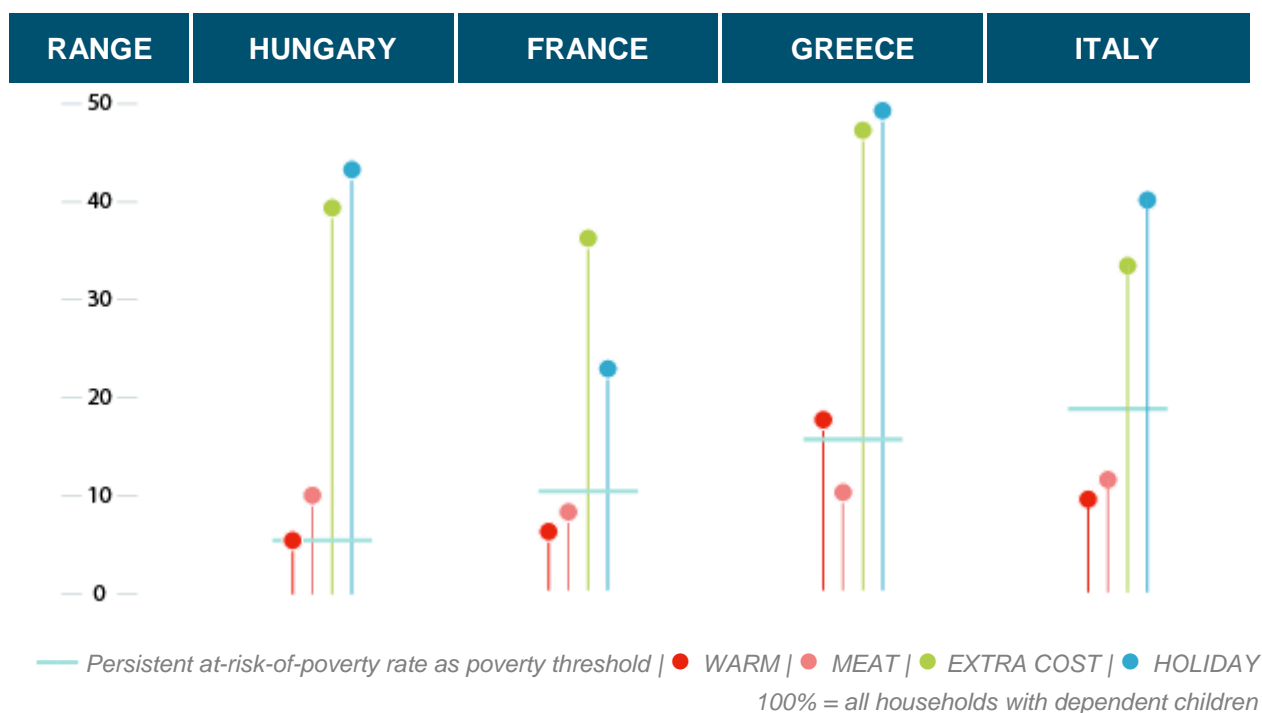
[14] **ILC_MDES01**, **ILC_MDES02**, **ILC_MDES03** and **ILC_MDES04**

The permanent risk of poverty rate is based on self-defined perception, the subjective opinion of many people can be considered the consensus of society. In other words, these numbers can show the subjective *poverty threshold*.

In Hungary, 5.5% of households with dependent children live under the poverty threshold, and 5.5% cannot warm their homes adequately. So, society identifies poverty entirely with people who are unable to heat their homes. Regardless of how often they eat meat. In Greece, it is the other way around. 10% of households with children cannot afford to put meat on the dining table every two days. Since 15.4% of households live below the poverty line, the lack of meat is a sign of poverty by definition. Of course, those who cannot keep their home warm can also be said to be poor, but not in all cases. In France and Italy, the lack of a warm home and also the lack of meat fully determine social deprivation. Households with dependent children living below the poverty line cannot afford a meal with meat, fish (or vegetarian equivalent) every second day and have problems with keeping home adequately warm.

Although the sociological definition of poverty and social exclusion emphasizes the subjective elements of poverty, the results of these surveys do not reflect monetary poverty. Looking strictly at the objective facts, poverty has a reasonably high correlation with economic performance. The higher GDP per capita leads to a lower proportion of impoverished people.

Table 19 Population under monetary poverty threshold by country in 2019[15]

COUNTRY	MONETARY POVERTY		EMPLOYED	GDP PER CAPITA
France	7.4%		42.4%	31 310
Italy	7.3%		42.6%	30 036
EU27	**8.4%**		**46.9%**	**31 401**
Greece	12.9%		44.3%	17 096
Hungary	14.2%		48.2%	14 993

100% = all population   *euro*

The most controversial case is Hungary, where the GDP per capita is the lowest, and the objective poverty indicator is the highest despite the self-defined risk of poverty being low.

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[15] **ILC_LI51**

4.1.3   HEALTH CONDITION

Health statistics are part of the EU-SILC surveys. The self-defined health status of the respondents correlates quite with life expectancy. Where people are supposed to live more than 80 years, the value tends to be good or very good. Where life expectancy is shorter, the average health condition of the people is probably worse.

Values of self-defined health status

- **5** *– very good*
- **4** *– good*
- **3** *– fair*
- **2** *– bad*
- **1** *– very bad*

Table 20 Life expectancy at birth and self-defined health status by country in 2019 [16]

COUNTRY	LIFE EXPECTANCY	18-64 YO	65+ YO
Italy	83.6	4.011	3.202
France	83.0	3,994	3.318
Greece	81.7	4.453	3.315
EU27	**81.3**	**3.947**	**3.223**
Hungary	76.5	3.861	2.945

Life expectancy at birth is a predictive indicator based on the average age at death in the past period taking trends into account. The metric actually shows past and present health conditions of societies. A striking difference between European countries is apparent:

- the Western European, Mediterranean and Scandinavian countries are above the EU average between 81.3 and 84.3 years,
- the post-communist countries are at least two years behind the EU average between 75.1 and 79.3 years.

The former iron curtain is the sharp difference between the two halves of the continent. According

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[16] **SDG_03_10** and **ILC_LVHL01** considering data before COVID-19 pandemic

to demographers, the reason is the shock-like deindustrialization during the regime change. In Hungary, for example, between 1988 and 1995, almost every second industrial worker lost their job. The livelihood crisis associated with mass unemployment thirty years ago and the caused stress harmed the mental and physical health of the population, increasing the risk of cardiovascular diseases.

Codes of cause of death

- *CANCER – malignant or non-malignant neoplasm*

- *CARDIO – diseases of the circulatory system*

- *LUNG – diseases of the respiratory system*

- *DIGEST – diseases of the digestive system*

- *OTHER – other causes of death*

Table 21 Cause of death by country in 2019 [17]

COUNTRY	CANCER	CARDIO	LUNG	DIGEST	OTHER
France	28.32	23.79	7.40	4.00	36.49
Italy	27.98	33.70	8.38	3.61	26.33
Greece	24.61	35.34	10.91	2.87	26.27
Hungary	25.22	49.09	6.43	4.90	14.36

100% = population

4.1.4   BRIEF SUMMARY

The results of Eurostat research provide a stable basis for understanding the demographic conditions of regions. However, the cause-and-effect relationships between subjective poverty indicators and economic records are difficult to reveal.

- Areas further from the economic gravity centre and axis are more affected by lower employment, population decrease and ageing.

- The monetary poverty is more consistent with economic performance, and the subjective risk of poverty differs from the trends.

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[17] **HLTH_CD_ACDR2**

Due to the methodology of some Eurostat research, a limited basis of comparison is provided for the interpretation of the survey carried out on the demo sites.

- The risk-of-poverty indicator is a self-reported metric. It has objective features, but it is basically a subjective perception.

- Statistics about the health conditions and the risk of poverty is on the national level, they are not interpretable to the local context.

- The results of household surveys can be applied to a limited extent to the demo sites, as the EU-SILC research excludes the collective households and institutions.

4.2 QUESTIONNAIRE

The survey tries to discover the level of energy awareness, risk of energy poverty, and subjective perception of the demo building. The purpose of the questionnaire is the preparation of social innovation activities.

Table 22 Response number of the end-user in demo sites

DEMO SITE	RESPONSE	INTERVAL	COMPLETION RATE
France	10	1 – 26 June	73%
Greece	22	17 – 29 May	56%
Italy	7	4 – 25 May	77%
Hungary	29	4 – 25 May	71%

4.2.1 DEMOGRAPHY

Due to the functions of the buildings, the demographic characteristics of the respondents differ in the different demo sites. The residents of the university dormitories come from the young adult generation and have a secondary or higher education degree. By definition, the residents of the nursing home for the elder come from the age groups over 65 years old. At the French demo site, the majority of the interviewed people belong to the working-age generation.

The households on each demo site mainly consist of one or two adults. The dependent children are exceptional. Even though the two demo sites are university dormitories,

- 95.5 percent of Hungarian students have a part or full-time job,
- 36.9% of the Greek residents have income
- 30.7% of the French respondents are employed.

4.2.2   ENERGY AWARENESS

One of the expectations in REHOUSE is that involving the residents of the buildings can be active participants in the energy renovation project. One of the most important goals of the questionnaire is to define the starting point of social innovation and detect the knowledge of residents about their residential buildings and their households to start building participation.

It is not completely clear to all respondents which network the building is connected to. The external electrical source of the building is relatively straightforward. It is also probably clear that the buildings need external help to provide heating, but its source is not known. However, the proportion of responses related to water supply is particularly surprising.

Table 23 Opinions on networks connected to the building

DEMO SITE	WATER	ELECTRICITY	NATURAL GAS	DISTRICT HEATING	I DON'T KNOW
France	50.0%	100%	100%	-	-
Greece	90.1%	95.4%	-	9.1%	4.5%
Italy	42.9%	85.7%	85.7%	-	14.3%
Hungary	72.4%	72.4%	58.6%	13.8%	34.5%

100% = all respondents by demo site

The residents' knowledge about the presence or absence of the centralized systems used by the building, for example, a common hot water boiler or a common heating system, is much more confident.

Table 24 Opinions on centralized energy solutions applied in the building

DEMO SITE	HOT WATER	HEATING	COOLING	NONE OF THEM	I DON'T KNOW
France	-	-	-	70.0%	30.0%
Greece	59.1%	72.7%	27.3%	-	13.6%
Italy	-	14.3%	-	57.1%	28.6%
Hungary	75.9%	89.7%	10.3%	-	13.8%

100% = all respondents by demo site

The respondents' uncertainty regarding using energy-saving or energy-storage solutions is exceptionally high. With the exception of the French demo site, the 'I don't know' answer dominates. Interestingly, the cleaning of the old brick facade of the Hungarian demo building gives the impression that it has received external insulation, while this is part of this project.

Codes of feature

- **BATT** – *electrical energy storage*
- **MLW** – *multi-layered window*
- **INSU** – *building envelop / insulation*
- **VENT** – *heat recovery ventilation*
- **GRAY** – *greywater tank*
- **NONE** – *none of above*

Table 25 Opinions on energy conserving solutions in the building

DEMO SITE	BATT	MLW	INSU	VENT	GREY	NONE	I DON'T KNOW
France	-	60.0%	-	-	-	30.0%	10.0%
Greece	9.1%	18.2%	27.3%	9.1%	9.1%	9.1%	59.1%
Italy	-	-	-	-	-	-	100.0%
Hungary	6.9%	41.4%	27.6%	3.1%	-	34.5%	55.2%

100% = all respondents by demo site

In another approach, the questionnaire examines what kind of energy is used for services and household activities. As the goal is to explore energy awareness, the value of the most frequently

answered option is considered a coherence indicator. In the metric, 1 means that one hundred percent of the respondents marked the same answer, a lower value indicates that several answer options were marked, including the 'I don't know' option.

Table 26 Coherence of the knowledge about energies used in households

DEMO SITE	COOKING	WARM WATER	HEATING	COOLING
France	0.80	1.00	0.90	0.80
Greece	0.90	0.36	0.55	0.50
Italy	0.58	0.86	1.00	0.71
Hungary	1.00	0.25	0.29	0.54

coherence between 0 and 1

Most people are aware of the energy used for cooking. Regarding the other services, the coherence of the answers can be divided into two groups. Greek and especially Hungarian university students have limited knowledge about the source energy of heating and hot water. On the French and Italian demo sites, this coherence is quite strong.

Practices with which energy consumers try to reduce their energy consumption or compensate for insufficient service are part of energy awareness. The questionnaire listed 12 practices and tricks, and the respondents could give other ideas. In each location, the number of energy-saving measures used by residents varies quite widely.

Table 27 The number of the applied energy-savings practices and tricks

DEMO SITE	0	1-2	3-4	5-6	7-8	9-10	11+
France	-	-	11.1%	11.1%	33.3%	33.3%	11.1%
Greece	4.8%	14.3%	38.1%	14.3%	14.3%	14.3%	-
Italy	-	-	28.6%	42.9%	14.3%	14.3%	-
Hungary	4.8%	4.8%	14.3%	33.3%	28.6%	4.8%	9.6%

100% = all respondents

4.2.3   SATISFACTION

As the REHOUSE project involves buildings in which the end-users are not the owners, they had the opportunity to express their opinion on how satisfied they are with the various spaces in the apartment or building. Answers on scale of 1 to 5 related to energy comfort open the subject of energy efficiency and the risk of energy poverty.

Table 28 Satisfaction with kitchen

DEMO SITE	TYPE	EQUIPMENT
France	private	2.8
Greece	shared	3.3
Italy	private	4.8
Hungary	shared	3.3

Table 29 Satisfaction with laundry

DEMO SITE	TYPE	EQUIPMENT
France	private	4.0
	none	1.0
Greece	shared	3.3
Italy	private	4.8
	none	N/A
Hungary	shared	3.3

Table 30 Satisfaction with bathroom

DEMO SITE	TYPE	EQUIPMENT	WARM WATER
France	private	2.5	4.0
Greece	private	3.2	3.1
Italy	private	4.8	4.0 [N/A]
Hungary	shared	3.1	3.1

on the scale of 1 to 5

[N/A] proportion of the *not applicable* respond is 71.4%

If the value of 4 is considered as a minimum expected value, then in most cases, the residents' expectations do not meet the quality of the buildings. A susceptible subject is the temperature. In the case of three demo sites, the heating efficiency in the winter and cooling options in the summer shows the lowest values of all the topics whose satisfaction was measured.

Table 31 Satisfaction with living spaces

DEMO SITE	SIZE	NATURAL LIGHT	HEATING	COOLING
France	4.0	4.3	2.6	1.6
Greece	3.3	3.6	2.9	2.2
Italy	3.7	4.0	4.0 [N/A]	4.0 [N/A]
Hungary	3.1	3.4	3.0	2.9

on the scale of 1 to 5

4.2.4 RISK OF POVERTY

There are several methods of assessing the risk of energy poverty, all of which can give an idea of the condition of the buildings, the possibilities and the expectations of the residents. In the previous chapter, satisfaction with cooling and heating systems was already examined. The following table is similar, but it takes into account environmental factors and challenges.

Table 32 Satisfaction with temperature of apartment

DEMO SITE	WARM IN THE WINTER	COOL IN THE SUMMER
France	1.9	2.0
Greece	2.1	2.8
Italy	2.7	2.5
Hungary	3.1	2.3

on the scale of 1 to 5

[N/A] proportion of the *not applicable* respond is 71.4%

Certain malfunctions of the buildings are taken into account as a clear indication of the risk of energy poverty. The questions do not examine how intense these problems are, but their unresolved nature may indicate energy poverty. The damp walls, floors or foundation appears on all demo sites.

Codes of disfunction

- ***ROOF*** *– leaking roof / ceiling*
- ***DAMP*** *– damp walls / floors / foundation*
- ***ROT*** *– rot in window frames or floor*

Table 33 Malfunction of apartment or building

DEMO SITE	ROOF	DAMP	ROT
France	-	36.4%	9.1%
Greece	9.5%	47.6%	38.1%
Italy	-	57.1%	-
Hungary	5.3%	36.8%	21.1%

100% = all valid respond

Similar to the EU-SILC survey, the 'inability' questions were applied in the questionnaire completed on the demo sites. Although the number of answers received is low, and the comparability of the data also faces other methodological problems, the following table shows the proportion of the 'cannot afford' answers.

Codes of expenses

- ***WARM*** *– inability to keep home adequately warm in the winter*
- ***COOL*** *– inability to keep home adequately cool in the summer*
- ***MEAT*** *– inability to afford a meal with meat, fish (or veg. equivalent) every second day*
- ***HOLIDAY*** *– inability to afford paying for one-week annual holiday away from home*
- ***EXTRA COST*** *– inability to cover unexpected financial expenses*

Table 34 Inability to cover expenses

DEMO SITE	WARM	COOL	MEAT	HOLIDAY	EXTRA COST
France	-	-	11.1%	57.1%	33.3%
Greece	-	-	-	5.9%	-
Italy	-	16.7% ^N/A	*N/A*	*N/A*	*N/A*
Hungary	16.7% ^N/A	20.0% ^N/A	-	-	7.1%

100% = all valid respond

A more detailed picture of the residents of the demo buildings is gained by showing the average value of the answers from 1 to 6. A lower value indicates that it is easy to cover an expense, and a higher value shows the difficulty or inability. As the residents in three demo sites do not have to pay utility costs directly, those cells are left empty.

Table 35 Difficulty to cover expenses

DEMO SITE	WARM	COOL	MEAT	HOLIDAY	EXTRA COST
France	4.3	3.3	4.3	5.6	5.0
Greece	-	-	3.4	3.8	4.0
Italy	-	-	*N/A*	*N/A*	*N/A*
Hungary	-	-	1.6	2.7	2.4

on the easy-difficult scale of 1 to 6

An important indicator of energy awareness is whether people are aware of energy consumption. In demo sites where the residents do not pay for utilities directly, due to the absence of a monthly statement, it cannot be expected that they can know their consumption. On the French demo site, where residents pay for energy, the majority of them, depending on the category 80-100%, cannot tell their monthly consumption in the measurement unit of the energy. However, more respondents can answer how big part of the household budget is energy expenses. Merely 30-40% is the 'I don't know' answer rate.

5   CONCLUSIONS

Although regional socio-economic characteristics do not have a direct impact on the REHOUSE project, it can be a starting point for understanding the local context. The regions of the demo sites differ based on their location in their own country and also in the European economic network. The discrepancy in employment is particularly strong, peripheral regions are exposed to negative demographic processes.

Different methodologies spotlight different dimensions of poverty. The self-defined status surveys rely on the perceptions and reveal the risk of poverty and social exclusion. The monetary poverty metrics focus on objective aspects and correlate with economic records. Unfortunately, the poverty statistics are aggregated on the national level, and they cannot show the territorial inequalities that emerge from employment and economic performance data.

Due to methodological reasons, the results of the questionnaire research conducted at the demo sites can only be limitedly compared to regional data, but it provides valuable information for social innovation.

In general, it can be stated that energy awareness is at a low level. The exceptional case is the energy-saving practices and tricks of households, but the technical knowledge related to energy systems and the building is incomplete. Residents who pay directly for energy have knowledge about energy consumption. Due to the characteristics of the demo locations, this means the minority of the end-users.

The symptoms of the risk of poverty appear in the demo sites. Due to the social function of the buildings, the end-users do not represent the working-age layer of the society. University dormitories are somewhat of an exception, as the residents are at the beginning of their careers, so their exposition to poverty is expected to be temporary and their position in the labor market will improve.

Damp walls, floors or foundations were reported in all buildings, indicating technical issues that need to be solved during the renovation. Although there are climate differences among the regions, due to extreme weather phenomena, the expectations placed on buildings are the same.
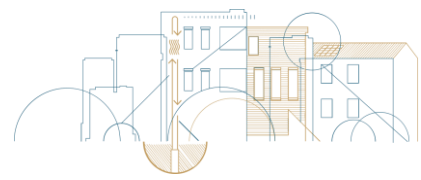
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7   ANNEX A – REGIONAL STATISTICS RECORDS

Table 36 GDP per capita in 2021 and population of European countries between 2018 and 2022 [18]

COUNTRY / NUTS 2	GDP PER CAPITA in 2021	POPULATION in 2018	POPULATION in 2022	GROWTH RATE
Luxembourg	113 899	0.60	0.65	7.21%
Ireland	85 149	4.83	5.06	4.75%
Switzerland	78 004	8.48	8.74	3.00%
Norway	76 707	5.30	5.43	2.45%
Île de France	61 938	12.21	12.33	0.95%
Denmark	57 657	5.78	5.87	1.60%
Sweden	51 746	10.12	10.45	3.28%
Netherlands	49 003	17.18	17.59	2.38%
Austria	45 468	8.82	8.98	1.78%
Finland	45 452	5.51	5.55	0.64%
Belgium	43 472	11.40	11.62	1.92%
Germany	43 314	82.79	83.24	0.54%
Lombardia	40 388	10.04	9.94	−0.93%
France	36 964	67.03	67.87	1.26%
Emilia-Romagna	36 787	4.45	4.43	−0.61%
Lazio	34 472	5.90	5.71	−3.08%
United Kingdom	33 959	66.27	67.51	1.86%
EU27	**32 489**	**446.21**	**446.74**	**0.12%**
Italy	30 084	60.48	59.03	−2.40%
Malta	29 031	0.48	0.52	9.52%
Lorraine	26 917	2.328	2.318	−0.43%
Cyprus	26 807	0.86	0.90	4.68%
Spain	25 462	46.66	47.43	1.66%
Slovenia	24 755	2.07	2.11	1.95%
Budapest + Pest	24 229	3.012	3.032	0.01%
Estonia	23 642	1.32	1.33	0.96%
Attiki	22 953	3.76	3.81	1.33%

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[18] **NAMA_10R_2GDP** and **DEMO_R_D2JAN**
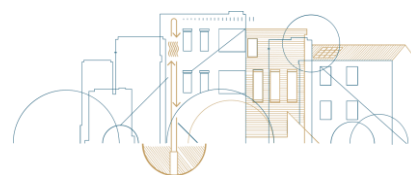
COUNTRY / NUTS 2	GDP PER CAPITA in 2021	POPULATION in 2018	POPULATION in 2022	GROWTH RATE
Czechia	22 702	10.61	10.52	−0.88%
Portugal	20 826	10.29	10.35	0.59%
Lithuania	20 095	2.81	2.81	−0.10%
Puglia	18 212	4.048	3.923	−3.10%
Slovakia	18 045	5.44	5.43	−0.15%
Latvia	17 798	1.93	1.88	−3.03%
Greece	17 013	10.74	10.46	−2.62%
Hungary	15 801	9.78	9.69	−0.91%
Poland	15 190	37.98	37.65	−0.85%
Croatia	14 432	4.11	3.86	−5.92%
Romania	12 565	19.53	19.04	−2.51%
Thraki	11 998	0.601	0.561	−6.71%
Bulgaria	10 276	7.05	6.84	−2.99%
Montenegro	7 983	0.62	0.62	−0.75%
Serbia	7 761	7.00	6.80	−2.92%
North Macedonia	5 650	2.08	1.84	−11.48%

euro *million people*

Table 37 GDP per capita in 2019 by NUTS 2 region in REHOUSE countries [19]

NUTS 2	GDP PER CAPITA	DIFF	NUTS 2	GDP PER CAPITA	DIFF in pct
Île de France	61 987	+0.980	Bolzano	48 543	0.616
Rhône-Alpes	36 386	+0.162	Lombardia	39 753	0.324
Provence-Alpes-C'dA	33 634	+0.074	Trento	39 475	0.314
Alsace	33 344	+0.065	Valle d'Aosta	38 686	0.288
Midi-Pyrénées	32 882	+0.050	Emilia-Romagna	36 498	0.215
Pays-de-la-Loire	32 098	+0.025	Lazio	34 986	0.165
Aquitaine	31 676	+0.012	Veneto	33 999	0.132
France	31 310	0.000	Toscana	32 930	0.096
Bretagne	30 493	−0.026	Liguria	32 685	0.088
Haute-Normandie	30 058	−0.040	Friuli-Venezia Giulia	32 496	0.082

[19] **NAMA_10R_2GDP**

NUTS 2	GDP PER CAPITA	DIFF
Champagne-Ardenne	30 020	−0.041
Centre - Val de Loire	29 513	−0.057
Bourgogne	29 442	−0.060
Nord-Pas-de-Calais	29 193	−0.068
Auvergne	29 157	−0.069
Poitou-Charentes	29 134	−0.069
Corse	28 175	−0.100
Basse-Normandie	27 976	−0.106
Limousin	26 981	−0.138
Franche-Comté	26 980	−0.138
Languedoc-Roussillon	26 926	−0.140
Picardie	26 565	−0.152
Lorraine	26 207	−0.163
		0.124

NUTS 2	GDP PER CAPITA	DIFF in pct
Piemonte	31 829	0.060
Italy	30 036	0.000
Marche	28 234	-0.060
Umbria	26 424	-0.120
Abruzzo	25 502	-0.151
Basilicata	23 070	-0.232
Sardegna	21 851	-0.273
Molise	21 648	-0.279
Puglia	19 414	-0.354
Campania	19 367	-0.355
Sicilia	18 238	-0.393
Calabria	17 522	-0.417
		0.239

NUTS 2	GDP PER CAPITA	DIFF
Budapest + Pest	23 119	+0.542
Hungary	14 993	0.000
Nyugat-Dunántúl	14 582	−0.027
Közép-Dunántúl	13 843	−0.077
Dél-Alföld	10 804	−0.279
Dél-Dunántúl	10 153	−0.323
Észak-Magyarország	9 905	−0.339
Észak-Alföld	9 593	−0.360
		0.278

NUTS 2	GDP PER CAPITA	DIFF
Attiki	23 420	0.370
Notio Aigaio	18 425	0.078
Greece	17 096	0.000
Ionia Nisia	16 013	−0.063
Sterea Ellada	15 497	−0.094
Dytiki Makedonia	14 592	−0.147
Peloponnisos	14 524	−0.150
Kriti	14 508	−0.151
Kentriki Makedonia	13 337	−0.220
Thessalia	13 032	−0.238
Dytiki Ellada	12 385	−0.276
Ipeiros	12 090	−0.293
Thraki	11 633	−0.320
Voreio Aigaio	11 572	−0.323
		0.209

euro

Table 38 Age structure of the population by REHOUSE country and NUTS 2 region in 2019[20]

COUNTRY	POPULATION	0-24 YO	25-64 YO	65+ YO
EU27	**446 446 444**	**115 114 729**	**240 948 425**	**90 383 290**
France	67 177 636	20 018 432	33 704 694	13 454 510
Italy	59 816 673	13 707 870	32 415 588	13 693 215
Greece	10 724 599	2 635 534	5 725 792	2 363 273
Hungary	9 772 756	2 470 596	5 412 201	1 889 959
Puglia	3 975 528	948 281	2 149 233	878 014
Budapest + Pest	*3 031 160*	*752 672*	*1 700 436*	*578 052*
Lorraine	2 322 213	657 698	1 185 862	478 653
Budapest	1 752 286	399 438	993 993	358 855
Pest	1 278 874	353 234	706 443	219 197
Thraki	599 723	148 401	312 513	138 809

Table 39 Employed population by REHOUSE country and NUTS 2 region in 2019[21]

COUNTRY	POPULATION	EMPLOYED
EU27	**446 446 444**	209 449 870
France	67 177 636	28 495 490
Italy	59 816 673	25 503 900
Greece	10 724 599	4 751 960
Hungary	9 772 756	4 715 060
Budapest + Pest	*3 031 160*	*2 095 400*
Budapest	1 752 286	1 617 630
Puglia	3 975 528	1 388 500
Lorraine	2 322 213	819 520
Pest	1 278 874	477 770
Thraki	599 723	241 040

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[20] **NAMA_10R_2GDP** and **DEMO_R_D2JAN**
[21] **NAMA_10R_2GDP** and **DEMO_R_D2JAN**
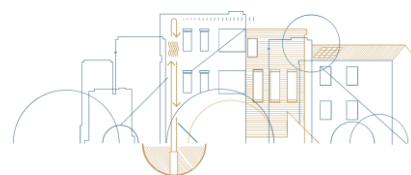
Table 40 Annual compensation by NUTS 2 region in 2019 [22]

COUNTRY	COMPENSATION PER EMPLOYED	COMPENSATION	EMPLOYED
Lorraine	45 911.14	37 625.1	819 520
France	44 374.00	1 264 459.0	28 495 490
Italy	28 506.77	727 033.9	25 503 900
Puglia	23 410.30	32 505.2	1 388 500
Greece	13 942.37	66 253.6	4 751 960
Hungary	13 420.13	63 276.7	4 715 060
Thraki	12 214.57	2 944.2	241 040
Budapest + Pest	11 475.80	24 046.4	2 095 400

euro

Table 41 Median age by country and NUTS 2 region in 2018 and 2022 [23]

COUNTRY / NUTS 2	MEDIAN AGE in 2022	MEDIAN AGE in 2018	CHANGE
Italy	48.0	46.3	+1.7
Puglia	47.3	45.2	+2.1
Portugal	46.8	44.8	+2.0
Greece	46.1	44.6	+1.5
Thraki	46.4	44.6	+1.8
Germany	45.8	46.0	−0.2
Croatia	45.4	43.7	+1.7
Bulgaria	45.1	44.1	+1.0
Spain	45.1	43.6	+1.5
Liechtenstein	44.8	44.0	+0.8
Slovenia	44.7	43.8	+0.9
Lithuania	44.5	43.9	+0.6
Latvia	44.0	43.3	+0.7
Hungary	43.9	42.6	+1.3
Czechia	43.8	42.3	+1.5
Austria	43.6	43.2	+0.4
Lorraine	43.6	43.0	+0.6

[22] **NAMA_10R_2GDP** and **DEMO_R_D2JAN**
[23] **DEMO_R_PJANIND2**
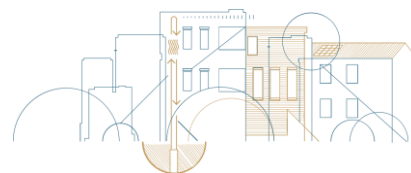
Romania	43.5	42.1	+1.4
Finland	43.4	42.7	+0.7
Serbia[24]	43.2	43.9	−0.7
Budapest + Pest	42.9	41.8	+1.1
Switzerland	42.8	42.4	+0.4
Netherlands	42.7	42.6	+0.1
Estonia	42.6	42.0	+0.6
Denmark	42.3	41.8	+0.5
France	42.2	41.6	+0.6
Poland	42.0	40.6	+1.4
Belgium	41.9	41.6	+0.3
Slovakia	41.8	40.2	+1.6
North Macedonia	41.1	38.4	+2.7
Sweden	40.7	40.6	+0.1
Malta	40.4	40.4	+0.0
Norway	40.4	39.5	+0.9
United Kingdom[25]	40.0	40.2	−0.2
Luxembourg	39.7	39.4	+0.3
Montenegro	39.4	38.5	+0.9
Ireland	38.8	37.3	+1.5
Cyprus	38.3	37.5	+0.8
Albania	38.2	36.1	+2.1
Iceland	36.7	36.3	+0.4
Türkiye[26]	32.8	31.4	+1.4

Table 42 Average size of the households by country in 2022[27]

COUNTRY	HOUSEHOLD SIZE
France	2.2
Greece	2.6
Italy	2.2
Hungary	2.3

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[24] between 2015 and 2020
[25] between 2014 and 2019
[26] between 2016 and 2021
[27] **ILC_LVPH01**

*Table 43 Risk of poverty of **single-person household** by inability factors by country in 2019[28]*

COUNTRY	WARM	MEAT	HLDY	COST
Italy	13.6	12.0	46.7	39.3
Greece	22.9	14.9	53.6	55.3
EU27	**9.4**	**11.7**	**32.8**	**39.3**
France	9.5	13.9	29.7	34.7
Hungary	8.7	19.0	43.9	32.0

100% = all households

*Table 44 Self-defined health status of **18-64** year-old population by country in 2019 [29]*

COUNTRY	5 – VERY GOOD	4 – GOOD	3 – FAIR	2 – BAD	1 – VERY BAD
Greece	59.2	30.7	7.1	2.2	0.8
France	31.1	44.8	17.5	5.7	0.8
Italy	20.0	64.4	12.9	2.1	0.6
EU27	**24.4**	**52.4**	**17.7**	**4.5**	**1.0**
Hungary	21.0	51.7	21.2	4.7	1.3

100% = all households

*Table 45 Self-defined health status of **65+** year-old population by country in 2019[30]*

COUNTRY	5 – VERY GOOD	4 – GOOD	3 – FAIR	2 – BAD	1 – VERY BAD
Greece	7.4	38.4	36.9	12.9	4.4
France	7.0	37.6	38.2	14.6	2.6
Italy	3.0	36.8	41.1	15.6	3.5
EU27	**4.7**	**35.4**	**41.0**	**15.3**	**3.6**
Hungary	1.5	21.2	53.3	18.3	5.7

100% = all respondents

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[28] **ILC_MDES01**, **ILC_MDES02**, **ILC_MDES03** and **ILC_MDES04**
[29] **ILC_LVHL01**
[30] **ILC_LVHL01**
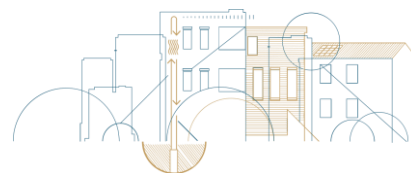
Table 46 Life expectancy by country in 2019[31]

COUNTRY	LIFE EXPECTANCY
Liechtenstein	84.3
Switzerland	84.0
Spain	84.0
Italy	83.6
Iceland	83.2
Sweden	83.2
Norway	83.0
France	83.0
Malta	82.9
Ireland	82.8
Luxembourg	82.7
Cyprus	82.3
Netherlands	82.2
Belgium	82.1
Finland	82.1
Austria	82.0
Portugal	81.9
Greece	81.7
Slovenia	81.6
Denmark	81.5
United Kingdom[32]	81.3
Germany	81.3

COUNTRY	LIFE EXPECTANCY
EU27	**81.3**
Czechia	79.3
Türkiye	79.1
Albania	79.1
Estonia	79.0
Slovakia	78.8
Croatia	78.6
Poland	78.0
Montenegro	76.7
North Macedonia	76.6
Hungary	76.5
Lithuania	76.5
Serbia	76.0
Latvia	75.7
Romania	75.6
Bulgaria	75.1

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[31] **SDG_03_10**
[32] in 2018

8   ANNEX B – QUESTIONNAIRE RESULTS

Table 47 Age of respondents

DEMO SITE	18-24 YO	25-34 YO	35-44 YO	45-54 YO	55-64 YO	65-74 YO	75-84 YO	85+ YO
France	-	-	22.2%	22.2%	11.1%	33.3%	-	11.1%
Greece	94.7%	-	5.3%	-	-	-	-	-
Italy	-	-	-	-	20%	60%	20%	-
Hungary	66.7%	33.3%	-	-	-	-	-	-

100% = all valid respond

Table 48 Highest education of respondents

DEMO SITE	ELEMENTARY SCHOOL	SECONDARY SCHOOL	BACHELOR DEGREE	MASTER DEGREE	N/A
France	11.1%	77.8%	-	-	11.1%
Greece	-	57.1%	38.1%	-	4,8%
Italy	20%	20%	-	-	60%
Hungary	-	76.2%	4.8%	9.5%	9.5%

100% = all valid respond

Table 49 Employment status of the adults in the household

DEMO SITE	EMPLOYEE	STUDENTS WITH INCOMES	STUDENTS WITHOUT INCOMES	UNEMPLOYED	RETIRED	N/A
France	30.7%	-	-	-	51.1%	10.2%
Greece	31.6%	5.3%	31.6%	10.5%	-	21.1%
Italy	-	-	-	-	72.7%	27.3%
Hungary	27.3%	68.2%	4.5%	-	-	-

100% = all resident in households

Table 50 Adults and children in the household

DEMO SITE	ADULT	CHILDREN
France	1.11	0.44
Greece	1.16	0.11
Italy	1.83	-
Hungary	1.69	-

average of the households

Table 51 Opinions on own energy sources of the building

DEMO SITE	SOLAR ENERGY	GEOTHERMAL ENERGY	WIND POWER	NONE OF THEM
France	-	-	-	70.0%
Greece	77.3%	18.2%	-	-
Italy	-	-	-	-
Hungary	6.9%	-	-	44.8%

100% = all respondents by demo site

Table 52 Opinion on used energy source for facilities in CEA

ENERGY	COOKING	WARM WATER	HEATING	COOLING
Electricity	20%	-	-	10%
Electricity with solar panel	-	-	-	-
Distinct heating	-	-	-	-
Natural gas	80%	100%	90%	-
Oil	-	-	-	-
None of above	-	-	-	80%
"*I don't know*"	-	-	10%	10%

100% = all respond

Table 53 Opinion on used energy source for facilities in DUTh

ENERGY	COOKING	WARM WATER	HEATING	COOLING
Electricity	90.1%	31.8%	54.5%	50.0%
Electricity with solar panel	-	36.4%	-	-
Distinct heating	-			-
Natural gas	-			-
Oil	-	-	22.7%	-
None of above	4.5%	-	-	45.5%
"*I don't know*"	4.5%	62.5%	22.7%	4.5%

100% = all respond

Table 54 Opinion on used energy source for facilities in ENEA

ENERGY	COOKING	WARM WATER	HEATING	COOLING
Electricity	57.1%	-	-	71.4%
Electricity with solar panel	-	-	-	-
Distinct heating	-	-	-	-
Natural gas	42.9%	85.7%	100%	-
Oil	-	-	-	-
None of above	-	-	-	14.3%
"*I don't know*"	-	14.3%	-	14.3%

100% = all respond

Table 55 Opinion on used energy source for facilities in FCHURCH

ENERGY	COOKING	WARM WATER	HEATING	COOLING
Electricity	100%	25.0%	12.5%	16.7%
Electricity with solar panel	-	-	-	-
Distinct heating	-	-	8.3%	-
Natural gas	-	12.5%	29.2%	-
Oil	-	-	-	-
None of above	-	-	-	54.2%
"*I don't know*"	-	62.5%	50.0%	29.2%

100% = all respond

Codes of feature

- **HOT WATER** – *hot water boiler*
- **HEATING** – *heating boiler*
- **THERMO** – *thermostat*
- **PORTRAD** – *portable radiator*
- **STOVE** – *stove / hearth / fireplace*
- **SHUTTER** – *shutter / blinds / sunshade*
- **AIRCON** – *air conditioner*
- **NONE** – *none of above*

Table 56 Opinions on energy solutions in the apartment

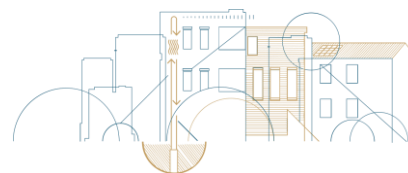| DEMO SITE	HOT WATER	HEATING	THERMO	PORTRAD	STOVE	SHUTTER	AIRCON	NONE
France	70.0%	40.0%	80.0%	-	-	-	-	-
Greece	59.1%	31.8%	31.8%	31.8%	4.5%	36.4%	27.3%	-
Italy	57.1%	42.9%	-	14.3%	42.9%	71.4%	28.6%	-
Hungary	24.1%	6.9%	3.5%	10.3%	-	10.3%	13.8%	24.1%

100% = all respondents by demo site

Codes of practices

- **DARK 1** – *to close the blinds / shutters for the night*
- **HEATING 1** – *to lower the heating at night or when you are not at home*
- **HEATING 2** – *to lower the heating when you are not at home*
- **INSULATION** – *to insulate the windows with textiles, sponge or foam*

Table 57 Energy-saving practices and tricks in winter

DEMO SITE	DARK 1	HEAT 1	HEAT 2	INSULATION	CLOTHING
France	67.7%	67.7%	44.4%	67.7%	11.1%
Greece	22.2%	55.6%	55.6%	22.2%	-
Italy	85.7%	14.3%	28.6%	28.6%	28.6%
Hungary	50.0%	40.9%	72.7%	9.1%	-

100% = all valid respond

Codes of practices

- **DARK 2** – *to close the blinds / shutters during the day*
- **WINDOW** – *to open the windows by nights*
- **VENTILATOR** – *to use ventilators or air conditioner moderately*

Table 58 Energy-saving practices and tricks in summer

DEMO SITE	DARK 2	WINDOW	VENTILATOR
France	100%	100%	44.4%
Greece	33.3%	88.9%	55.6%
Italy	85.7%	14.3%	71.4%
Hungary	81.8%	77.3%	59.1%

100% = all valid respond

Codes of practices

- **DIM LIGHT** – *to use energy-saving light bulbs or dim lights*
- **DEVICE** – *to buy energy-saving devices and equipment*
- **WASHING** – *to wash clothes at low temperature*
- **TV** – *to turn off the monitor or TV when you don't use it*
- **NIGHT** – *to turn off electric device for nights*

Table 59 Energy-saving practices and tricks in general

DEMO SITE	DIM LIGHT	DEVICE	WASHING	TV	NIGHT
France	100%	55.6%	66.7%	55.6%	11.1%
Greece	55.6%	22.2%	38.9%	83.3%	-
Italy	100%	71.4%	42.9%	-	-
Hungary	59.1%	18.2%	31.8%	45.4%	-

100% = all valid respond

Codes of expenses

- **WATER** – *paying for piped heating*
- **ELECTRIC** – *paying for electricity*
- **HEATING** – *paying for heating*
- **WARM** – *paying for* *keeping home adequately warm in the winter*
- **COOL** – *paying for* *keeping home adequately cool in the summer*

Table 60 Paying for energy expenses

DEMO SITE		WATER		ELECTRIC		HEATING		WARM	COOL
France	P	100%	1.7	100%	2.7	100%	3.3	4.3	3.3
	N/P								
	N/A								
Greece	P	23.8%	3.0	23.8%	3.7	19.0%	3.5	1.9	1.4
	N/P	71.4%		71.4%		71.4%			
	N/A	4.8%		4.8%		9.5%			
Italy	P			16.7%	5.0	16.7%	5.0	5.0	6.0
	N/P								
	N/A	100%		83.3%		83.3%			
Hungary	P	38.9%	1.4	41.2%	1.3	41.2%	1.3	2.8	2.6
	N/P	22.2%		23.5%		23.5%			
	N/A	38.9%		41.2%		41.2%			

P – paying for | N/P – not paying for | N/A – not applicable | 100% = all respond | on the easy-difficult scale of 1 to 6

Table 61 Difficulty to cover expenses

DEMO SITE	WARM	COOL	MEAT	HOLIDAY	EXTRA COST
France	4.3	3.3	4.3	5.6	5.0
Greece	1.9 [N/A]	1.4 [N/A]	3.4	3.8	4.0
Italy	5.0 [N/A]	6.0 [N/A]	*N/A*	*N/A*	*N/A*
Hungary	2.8 [N/A]	2.6 [N/A]	1.6	2.7	2.4

on the easy-difficult scale of 1 to 6

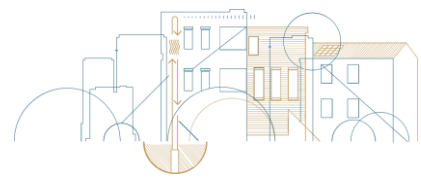[N/A] proportion of the *not applicable* or *not paying for energy* respond is between 58.8% and 83.3%

Table 62 Energy expenses in rate of the household budget in CEA

DEMO SITE	PART	ELECTRICITY	NATURAL GAS	PIPED WATER	OVERALL
France (CEA)	*<20%*	50.0%	30.0%	40.0%	
	20-40%	20.0%	30.0%	20.0%	20.0%
	60-80%				10.0%
	N/A	30.0%	40.0%	40.0%	70.0%

100% = all responds