D6.1 Technologies social and market acceptance

WP6, T6.1

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Versions

No.	*Name SURNAME*	*Partner*	*Contribution*	*Date*
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0.2	Irantzu URKOLA	TECNALIA	REVIEW	2022/03/23
0.3	Hugo MADUREIRA	ANESE	REVIEW	2022/03/25
0.4	Michele VALERY	RINA-C	Integration of comments from the review	2022/03/29
0.5	Irantzu URKOLA	TECNALIA	FINAL VERSION for SUBMISSION	2022/03/30
0.6	Irantzu URKOLA	TECNALIA	Gathering and sharing social data of the demo site in Pasaia	2023/04/25
	Enara Mendizabal	ALOKABIDE		
0.7	Michele VALERY	RINA-C	Updated version with data of Pasaia. Final version of the deliverable	2023/05/10

Abbreviations and acronyms

Acronym	Description
DHW	Domestic hot water
EU	European Union
ESCO	Energy Services COmpany
GHG	GreenHouse effect Gases
PE	Primary Energy
PV	Photovoltaics
WP	Work Package

Abstract of the HAPPENING project

Currently, **buildings are responsible for 40 % of the energy demand and 36% of the CO_2 emissions in Europe**. Decarbonisation of existing buildings plays a key role in order to reach the overall climate protection targets. However, current renovation rates lie in the order of 1%.

Heat pumps are a key technology in bringing renewable shares into heat supply of buildings; especially their combination with onsite renewable electricity production e.g. by PV allows to bring high renewable shares. Their current installation in existing multi-apartment buildings is however still marginal.

The proposed technological solution is based on decentralized heat pumps, in such a way that it results an easy-to-install solution for installers, low-intrusive for the occupants and easily adaptable to a large number of different building situations. This is flanked by developing near-zero planning, implementation and operation processes, in order to facilitate the work during the planning phase, ensure a high-quality installation and effective operation, and reduce the efforts and costs within the whole retrofitting project. The challenge of cost-competitiveness is addressed by developing new financial and business models. Bringing new players (such as financial experts) and financing models to the renovation market is expected to bring the needed paradigm change and boost investments in the residential retrofitting sector. Dissemination of measured performance and system characteristics from HAPPENING will be one of the key results of the project.

Through **3 demo sites (Spain, Italy and Austria)**, the project will demonstrate a highly versatile, scalable and replicable solution package for buildings energy system retrofitting allowing 70-75% of renewable energy fraction, 30-50% of PE and GHG savings, reduction of planning time by 50% and installation/operation time by 30% and payback time for ESCOs and investors of less than 8 years, compared to best available solution existing today.

1. Introduction

1.1 Objectives of the deliverable D6.1

The goal of the deliverable "***D6.1 Technologies social and market acceptance***" (related to the task T6.1) is to **assess the social benefits and market acceptance** of the HAPPENING solution. The environmental benefits of the HAPPENING solution are assessed in the deliverable *"D6.2 Technologies benefit impact in terms of emissions".*

Technologies social and market acceptance of the HAPPENING solution is assessed by integrating the outcomes of the analysis of existing literature with the primary social data gathered from the three pilot projects of Pasaia, Verzuolo, and Liezen.

1.2 Deliverable description

In this deliverable D6.1, a method is proposed for the social and market acceptance assessment of the HAPPENING system.

The deliverable D6.1 is structured in several chapters:

- Description of the HAPPENING concept and its social implications
- Methodology for social implications and acceptance assessment
    - Literature review
    - Social acceptance assessment
    - Engagement during the operation phase and further assessment
- Conclusions
- Annex

1.3 Contribution of partners

RINA-C contributes to the core parts of the deliverable, TECNALIA and ANESE are in charge of reviewing the deliverable. ALOKABIDE, TECNOZENITH and AEE INTEC provided the social data of their respective demo cases.

1.4 Relation with other activities in the project

The procedures and information developed in this deliverable (and also in the deliverable D6.2) feeds directly into task 6.3, as they are key aspects for business promotion and business models, like those related to municipalities with clear objectives for improving the air quality in the city, which has a deep impact on their building refurbishment strategy.

In addition, the WP6 “Replication and exploitation” is closely related to the WP5 “Near-zero planning, implementation and operation processes and tools”.

2. Description of the HAPPENING concept and its social implications

The objective of the HAPPENING system is to provide an easy-to-install "solution package" based on heat pumps to replace existing boilers in multi-family buildings. The "solution package" should include a complete set of technologies, tools and processes to allow installers and Energy Services Companies (ESCOs) do the retrofitting in an easy, reliable, cost-effective and qualified way, in order that most complex issues are solved in advance. The solution implemented must guarantee several attributes:

- **Measures capable to increase energy performance and renewable share of the building** must be included. The system solution must be industrialised and modular to fit to any generic dwelling in order to improve the replicability and promoting the adaptation of the renovation action to the extent of the available investments.
- In order to reduce design-associated costs **Low design effort** is needed. This promotes a high replicability of the renovation and solves well in advance potential compatibility issues among technologies.
- Only **Low intrusive solutions** should be implemented, this will be achieved through a system configuration thought specifically for retrofitting (using existing pipes, plug&play solutions and moving the main intervention to outside the living-areas), which will as well minimise disruption on site, shorten installation time and lower the risk of installation and commissioning errors.
- The implementation of an **Information Communications Technology (ICT) infrastructure** is essential. This will help (i) to implement control strategies optimising the energy management and maximizing the RES use, (ii) to monitor and communicate buildings' performance and comfort to consumers and manager in a continuous commissioning process and (3) to keep high operation standards of active technologies.

Thus, the system solution will guarantee:

- High renewable energy share, high energy performance, comfort, and healthiness to inhabitants
- Low design effort and low intrusive installation
- Scalability in terms of energy management, maintenance, and financing
- Financial support by external investors, as they are proven to be **bankable**

In order to demonstrate the effectiveness of the HAPPENING system, three demo buildings in Spain, Italy and Austria have been chosen to implement the solution. The locations of the three buildings were chosen aiming to assess the system in

different weather conditions. In the following sub-chapters social aspects and implications for each of the demo sites are described.

2.1 HAPPENING system and social aspects in Pasaia

The Spanish Demo Case Building for the HAPPENING project is located in the Municipality of Pasaia, in the province of Gipuzkoa, in the autonomous community of Basque Country, northern Spain. The chosen building is a multi-family building with 8 dwellings.

In the demo building the proposed system will consist of a neutral temperature water loop, the temperature of which will be maintained by means of central air-source heat pumps, and terminal micro water-source heat pumps for space heating and domestic hot water production. Domestic hot water will be then stored in an individual tank for each dwelling.

ALOKABIDE, a public social-housing entity is the owner of the building, and the residents are tenants of the dwellings. The residents are being engaged since the beginning, providing relevant information and also asking them for key information about their energy demands and uses to design the HAPPENING system.

The main positive impacts identified for the residents are:

- No fossil fuels in the dwellings
- Renewable energy production by means of PV panels
- Savings on their energy bills
- Higher level of comfort at home (faster heating, additional possibility of getting cooling, etc.)

Demographic characteristics of the Pasaia demo building are listed in the following table:

Number of Tenants for each dwelling	• four (4) dwellings with 1 tenant • four (4) dwelling with 2 tenants
Age of tenants	• two (2) aged between 30 and 39 years old • three (3) aged between 40 and 49 years old • one (1) aged between 50 and 59 years old • three (3) aged between 60 and 69 years old • one (1) aged between 70 and 79 years old

	• two (2) tenants whose age data could not be collected
Occupation of tenants	• five (5) employees • four (4) unemployed • two (2) retired • one (1) disability pension recipient
Nationality of tenants	• eight (8) Spanish • two (2) Moroccan • one (1) Romanian • one (1) Colombian
Gender of Tenants	• six (6) males • six (6) females

Table 2.1: Demographic data of Pasaia building's residents

The demographic data described above will primarily be used in the forthcoming stakeholder engagement phase described in section 3.3. However, from this, it is already possible to extract general demographic characteristics, namely:

- the residents of the dwellings are single individuals and couples
- they are of various nationality even though mostly Spanish (8 out of 12)
- regardless of age or type of resident family, all residents have presumably from very low to medium income

From which the following preliminary considerations can be deduced: (i) Spanish nationality (and especially being a native speaker) facilitates the engagement process also due to a stronger familiarity with national laws and bureaucracy, on the contrary residents of others nationality may need specific support to address bureaucracy-related issues and (ii) the level of income presumably does not allow for excessive expenditure (especially for unemployed and disabled residents) for the HAPPENING implementation, thus the financial support by external investors (and related stakeholder instruction on the use of the financing mechanisms) could be crucial.

2.2 HAPPENING system and social aspects in Verzuolo

The Italian Demo Case Building for the HAPPENING project is located in the Municipality of Verzuolo, in the Province of Cuneo in the region Piedmont, north-west of Italy. The chosen building is a multi-family building with 10 dwellings.

In this Demo building, the proposed system will consist of a primary neutral temperature water loop and several micro heat pumps as terminal units.

In the Italian Demo Case, all the dwellings have the same owner namely the Delgrosso family. Thus, residents are tenants, and the flats are now rented out under a lease agreement.

Although not being owners and having a limited voice in the decision-making process, the tenants were involved in the stakeholder engagement process. According to the information provided in *D4.2 End-user requirements and building constraints - Italian demo,* each tenant has been met individually by the owner and TECNOZENITH technicians. During the meetings, it was explained what the implementation of HAPPENING will imply and any doubts and concerns raised by residents were listened to. The outcomes of these consultations are summarized below:

- Residents were satisfied with the possibility of being able to take advantage of a future summer air conditioning system, which may not impact on the current costs paid for the services. This verdict was unanimous, especially supported by the tenants with bedroom facing south. Conversely, there was less interest in winter air conditioning as residents consider the current heating system to be adequate.
- The concern that arose most among the tenants was the impact of the works on the building and on their homes. They asked for clarification on the timing of construction works when they will begin. TECNOZENITH illustrated the work to be carried out in detail, underlining the minimal impacts envisaged.
- Regarding micro heat pumps, many tenants asked about the size and number of machines to be installed inside the buildings as they were concerned about having areas of the house occupied by rooms or technical appliances for this purpose.
- Some tenants expressed the desire to not install heat pumps in the condominium courtyard, which could steal parking space. Another issue that arose was the noise of the heat pumps themselves, which worried above all about possible nuisances during the night.

Below are listed the main demographic data of Verzuolo Demo's tenants:

Number of Tenants for each dwelling	• seven (7) dwellings with 1 tenant • two (2) dwellings with 2 tenants • one (1) dwelling with 3 tenants

Age of tenants	• one (1) under 10 years of age • two (2) aged between 21 and 30 years old • eight (8) aged between 31 and 40 years old • one (1) aged between 51 and 60 years old • two (2) aged between 61 and 70 years old
Occupation of tenants	• one (1) driver • three (3) office workers • three (3) agricultural workers • four (4) construction workers • two (2) hawkers
Nationality of tenants	• three (3) Italians • five (5) Romanians • four (4) Albanians • one (1) Palestinian • one (1) Malian
Gender of Tenants	• nine (9) males • five (5) females

Table 2.2: Demographic data of Verzuolo building's residents

The demographic data described above will primarily be used in the forthcoming stakeholder engagement phase described in section 3.3. However, from this it is already possible to extract general demographic characteristics, namely:

- The majority concentration of residents in the 30-40 age group
- The variety of nationalities among the residents of the dwellings

The fact that most of the residents are between 30 and 40 years old is a positive factor, as their relative youth indicates a tendency to be more open to changes (such as the HAPPENING solution) and the inevitable problems associated with them.

Conversely the variety of nationalities may indicate a difficulty on the part of foreign residents in properly receiving information and expressing their opinions. For this reason, throughout the stakeholder engagement phase, it should be ensured that the level of mutual understanding is adequate and if not, an interpreter should be used.

2.3 HAPPENING system and social aspects in Liezen

The Austrian Demo Case Building for the HAPPENING project is located in the Municipality of Liezen, which is the district capital of the Bezirk Liezen, located in the federal state of Styria, in the centre of Austria. The chosen building is a multi-family building with 20 dwellings.

The building is owned by the non-profit social housing company GWS. Being it a social housing, even if the residents are not owners, they have a strong say in the decision-making process, differently from the Italian housing demo.

According to the information provided *D4.3 End-user requirements and building constraints - Austrian demo,* tenants were engaged through a resident survey, tenants were informed first by email and followed by bilateral meetings to explain the system and foreseen installation procedure. Until now, 18 out of 20 dwellings agreed to participate in the HAPPENING integration, however, the intention is to make the building completely provided of the HAPPENING solution as soon as the two opposing residents have moved out. At the time of the development of this document it was not possible to consult the reasons for this refusal, nor any other issues raised by other residents, this gap will be filled during the next stage of stakeholder engagement described in section 3.3.

Below are listed the main demographic data of Liezen Building's residents:

Age of tenants	• four (4) aged between 21 and 30 years old • five (5) aged between 31 and 40 years old • four (4) aged between 41 and 50 years old • three (3) aged between 51 and 60 years old • three (3) aged between 61 and 70 years old • one (1) aged between 81 and 90 years old
Nationality of tenants	• seventeen (17) Austrians • one (1) Syrian • one (1) Afghan • one (1) Italian
Gender of residents	• eleven (11) males • seventeen (17) females • six (6) children

Table 2.3: Demographic data of Liezen building's residents

The demographic data described above will primarily be used in the forthcoming stakeholder engagement phase described in section 3.3. Unfortunately, due to the limited information provided, it is not possible at the moment to extract demographic characteristics useful for social assessment.

In general, given the reported refusal to implement HAPPENING by two of the building's 20 dwelling units, a continuous stakeholder engagement process is suggested, this should specially aim at including the most vulnerable (foreign and low-income tenants) in order to make them understand the implications of the HAPPENING system and make possible to express their concerns with a view to finding solutions that satisfy all parties.

3. Methodology for social implications and market acceptance assessment

In this chapter, the methodology for social implications and market acceptance assessment of the HAPPENING solution is developed.

In order to assess the social and market acceptance of the HAPPENING solution firstly the existing literature on social acceptance and implications of energy efficiencies innovation in buildings is analysed to obtain an overview of possible relevant benefits, issues, opportunities, and barriers.

Then, these findings are integrated with primary social data gathered from the three pilot projects in Spain, Italy, and Austria to outline a first assessment of the social implications and market acceptance of the HAPPENING solution.

Finally, further stakeholder engagement activities will be conducted during the operation phase to collect specific opinions of the relevant stakeholders (namely the residents of the three pilot projects) on the HAPPENING implementation.

3.1 Literature review

There is already a widespread literature on energy efficiency investments in the building sector. In developing this chapter, RINA-C has mainly focused on the literature that investigates (i) the potential social impacts of energy efficiency investments on society and (ii) which is the current status of the social acceptance of this energy efficient solutions within European population.

According to recent studies[2], energy efficient renovation could potentially affect various socioeconomic variables:

- economic activity and employment
- fiscal impact assessment
- environmental impact due to reduction of CO_2 emissions
- quality of life
- energy security

And among these potential impacts, the existing literature mainly focus on the following aspects:

- labour markets, with a focus on occupations and skills
- household income
- public health

[2] Davor Mikulić, Ivana Rašić Bakarić & Sunčana Slijepčević (2016) The socioeconomic impact of energy saving renovation measures in urban buildings, Economic Research-Ekonomska Istraživanja, 29:1, 1109-1125, DOI: 10.1080/1331677X.2016.1211952

Regarding the first aspect, i.e., **labour markets, with a focus on occupations and skills**, according to the existing literature[3], investment in energy efficiency will likely:

(i) lead to net employment generation, being energy efficiency activities more labour intensive (and less capital intensive) than the production of energy saved

(ii) lead to employment benefits as a result of the export potential of energy efficiency activities and / or from the substitution of imported energy

(iii) increase building values and rentals as a consequence of improved energy efficiency. US data suggest that values of buildings with certified energy performance are 10-16% higher than similar non-certified buildings

Concerning **household income**, the same studies claim that energy efficiency measures can lead to economic redistribution and poverty alleviation. Indeed, the excessive cost of energy primarily affects the poorest sectors of society, who often cannot afford energy to maintain a healthy environment in their homes, nor to have modern, energy-efficient homes. In this sense, this is probably the main social positive impact related to this Project and the one to focus on.

Strictly connected with the above, there is the topic of the **public health**. Different medical studies[4] have identified several health conditions associated with cold housing, such as circulatory diseases, respiratory problems, and mental ill-health. A meta-analysis[5] of the impact of energy efficiency measures on health, synthesising research from 36 primary research studies, found a small but significant and positive effect of household energy efficiency measures on health, with significant health benefits especially for children.

Regarding the social acceptance of energy efficiency activities, relying on a study[6] based on a comprehensive and holistic Social Sciences and Humanities (SSH) analysis, which is focused on European population, different levels of social acceptance are identified in different countries. In general, however, the study shows that there is a certain mistrust towards energy efficiency investments, mainly due to two factors:

(i) lack of knowledge of the subject

(ii) fear that economic return is not assured in this kind of investments

Other social barriers identified are the worry that these interventions will damage historic buildings, and the concern that tenants will not be able to continue to live in their homes during the renovation work. The study states that it is, therefore, necessary to start involving stakeholders from the earliest stages of the Project, so that they acquire awareness and can express their doubts and needs.

According to the abovementioned studies, the latter is undoubtedly the most common social barrier. If stakeholders are not adequately informed from the very beginning of the implementation of the project, they will tend to resist it especially if they are subjected to the inevitable impacts that every innovation brings with it. It is therefore appropriate to conduct

[3]Assessing the Employment and Social Impact of Energy Efficiency, Cambridge Econometrics, 2015

[4] Xavier Bonnefoy, Inadequate housing and health: an overview, 2007

[5] Maidment et al (2014).

[6] Dawid Krysiński *, Paweł Nowakowski and Przemysław Dana, Social Acceptance for Energy Efficient Solutions in Renovation Processes, 2017

information disclosure activities, so that all stakeholders are informed of both the benefits and the impacts of project implementation. This is especially crucial when a collective agreement is needed.

Another social barrier relates to those jobs whose usefulness may be reduced or eliminated as a result of the implementation of innovative solutions. For each innovation, it is appropriate to consider which technology will be replaced and how the associated supply chain will be affected. Usually, the best solution to mitigate this is to provide sector workers refresher courses on the new implemented technologies. However, when this is not possible, it is advisable to engage the affected workers and find a way out that satisfies all parties involved.

Finally, the last social barrier concerns those innovations that involve private investment. These barriers include two sub-barriers, namely:

- High investment costs and long payback times and lack of motivation connected to consumer priorities, attitude, and behaviour
- Lack of awareness of financing opportunities

In regard to the first, consumers' perceptions of prohibitive investment costs and long payback times along with lack of motivation in investing are a common problem for projects involving stakeholders as investors. In order to address these, the direct co-benefits of the intervention should be emphasised, the installation of innovative technologies should be done at the same time as other envisaged traditional works in order to reduce the time a building is unusable due to construction activities, emphasis should be put on those characteristics or attributes that the homeowner is more likely to value.

Concerning the second, it is typical that stakeholders are not properly aware of the financing opportunities which they can access to. Thus, promoting awareness of financial opportunities should be one of the activities to be undertaken since the earliest stage of the project.

3.2 Social Acceptance Assessment

In this section, the level of social acceptance of the HAPPENING implementation will be analysed, combining information gathered from the existing literature with data from the three pilot projects of Pasaia, Verzuolo, and Liezen.

First of all, when assessing the level of acceptance of the HAPPENING solution, it is necessary to identify the three types of residents who may inhabit a dwelling, namely:

- homeowners
- private renters

- residents of social housing

In fact, belonging to one of these three groups will yield corresponding rights and duties that will influence the level of acceptance and benefits of the HAPPENING solution.

In this respect, as already illustrated in section 2, in Verzuolo the residents are tenants and the property is private, while in Pasaia and Liezen, the property is owned by a social housing company, thus the tenants have strong rights when modifications are made within their dwellings.

In none of the three pilot projects the residents are homeowners, this category is presumably the one with the most resistance in accepting the HAPPENING solution, due to the need to invest the money themselves. In case of future implementation of the HAPPENING solution in dwellings owned by residents, it may happen that homeowners unanimously decide to implement the HAPPENING solution, but this could be achieved only due to the conduction of a comprehensive stakeholder engagement process implemented at an early stage of the project, in line with what is suggested in the existing literature reviewed above.

In Verzuolo, the HAPPENING solution has been implemented in all the dwellings concerned. However, this result was in this case obvious, since all the units belonged to the same owner, and the tenants had no direct say in the matter.

As for Pasaia, although residents here have more rights to object, they reportedly all agreed to the implementation of the HAPPENING solution.

Finally, regarding Liezen, eighteen (18) out of twenty (20) tenants decided to adhere to the HAPPENING implementation. At this stage of the project, the direct interaction with the residents has not been possible, so it is not possible to know the motivation for this refusal.

In view of the above, it seems clear that the HAPPENING solution has all the makings of a deployment that goes well beyond the pilot projects. Moreover, a system that (i) allows costs to be lowered, (ii) improves the quality of life by improving the liveability of homes, and (iii) also helps sustainability by lowering consumption and CO_2 emissions has all the characteristics to be accepted by European consumers.

However, as much as the HAPPENING solution has the characteristics for a diffusion on the European market, it should always be accompanied by the tools already used in the pilot projects, namely:

- the conduction of a stakeholder engagement process from the early stages of the project: this process must be continuous and also cover the operation phase and must guarantee both that the stakeholders are informed about the characteristics and implications of the project and that they have an influence in the decision-making process
- the provision of information and assistance concerning the appropriate financial instruments to facilitate the implementation of HAPPENING from the economic point of view

Finally, for an effective evaluation of the HAPPENING solution and its social acceptance, it will be necessary to consult the stakeholders of the pilot projects who have benefited from the solution after about one year of its implementation, in order to identify any issues or positive aspects that could not be highlighted in the early stages of the project.

3.3 Engagement during the operation phase and further assessment

As mentioned above, for an effective assessment of the social implications and acceptance of the HAPPENING solution, it will be appropriate, about one year after implementation, to directly consult the stakeholders affected in order to gather their thoughts on the implementation of the HAPPENING solution.

The overall objective of this further consultation will be to capture the specificities of each problem and opportunity encountered by each stakeholder in relation to the implementation of the HAPPENING system. From the individual cases, an attempt will be made to draw both specific and general trends so that these can be addressed in advance during future replication of the HAPPENING system. All data will be collected in accordance with the General Data Protection Regulation (EU) 2016/679 (GDPR).

This data collection will take place through the following tools:

- **Surveys**: the aim will be to ask to all the affected residents and owners (both private individuals and the social housing company), so that as many social groups as possible are represented. Depending on requirements, the surveys may be conducted in the following forms:
    - face-to-face surveys
    - self-administered paper and pencil surveys
    - self-administered online computer surveys

  The surveys will be structured in order to collect the following information:
    - role of the stakeholder towards the project (whether building owner, resident, or both)
    - stakeholder demographic data (if stakeholder is an individual, otherwise business description if the stakeholder is a company)
    - reasons for adhering to the implementation of HAPPENING system
    - specific HAPPENING implementation tested

  - how the implementation was financed (limited to building owners)
  - main improvements (both in economic terms and regarding quality of life) experienced thanks to the HAPPENING system
  - main problems encountered due to the implementation of the HAPPENING system
  - collection of any suggestions from stakeholders for a better future implementation of the HAPPENING system

- **Interviews**: interviews, if needed, will be specific and will cover a smaller sample aiming at capturing any nuances and particular issues that may have been missed by the quantitative data collection conducted through the questionnaires. The need for face-to-face interviews will be assessed after submission of the above-mentioned survey. In case needed, the sample will be selected that is as diverse and representative as possible.

4. Conclusions

This deliverable "D6.1 Technologies social and market acceptance" presents a method to assess the social benefits and acceptance of the HAPPENING solution.

Initially, the three pilot projects in Pasaia, Liezen and Verzuolo were presented, describing the social characteristics of the stakeholders involved.

The existing literature on the relationship between energy efficiency in buildings and social issues is analysed. From this analysis, the main issues linking the above are highlighted, namely:

- household income
- public health

After identifying typical social opportunities and barriers for energy efficiency projects, this information was used to assess the social impact of the HAPPENING solution and its potential acceptance in the European market.

The result of the assessment is undoubtedly positive, the HAPPENING solution guaranteeing (i) reduction of cost, (ii) quality of life improvement, thanks to the enhanced liveability of homes, and (iii) support to sustainability by lowering consumption and CO_2 emissions has all the characteristics for wide dissemination and acceptance provided that the tools for stakeholder engagement and financial support and advice are properly used.

However, for a definitive assessment, further engagement with stakeholders is required to capture any problem and opportunity that may only be revealed after the actual implementation of the HAPPENING solution.

Annex: References

- Davor Mikulić, Ivana Rašić Bakarić & Sunčana Slijepčević (2016) The socioeconomic impact of energy saving renovation measures in urban buildings, Economic Research-Ekonomska Istraživanja, 29:1, 1109-1125, DOI: 10.1080/1331677X.2016.1211952
- Assessing the Employment and Social Impact of Energy Efficiency, Cambridge Econometrics, 2015
- Xavier Bonnefoy, Inadequate housing and health: an overview, 2007
- Maidment et al (2014).
- Dawid Krysiński *, Paweł Nowakowski and Przemysław Dana, Social Acceptance for Energy Efficient Solutions in Renovation Processes, 2017
- The making of a smart city: replication and scale-up of innovation in Europe. EUSCIS
- Smart City Guidance Package for Integrated Planning and Management, 2017, NTNU, EIP-SCC