



Co-funded by the Intelligent Energy Europe
Programme of the European Union

**Promotion of smart and integrated NZEB renovation
measures in the European renovation market
(NeZeR)**

Contract N°: IEE/13/763/ SI2.674877
01-03-2014 – 28-02-2017

Roadmap for NZEBR and RES in Spain

10/02/2017
TECNALIA

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1. SUMMARY

The aim of the European NeZeR Project is to promote energy renovation of residential buildings in Europe towards nearly zero energy consumption, with the implementation and smart integration of technological packaged solutions and the use of renewable energies. One of the project activities is the drafting of a Roadmap for building renovation towards nearly zero energy consumption nationwide in each participating country. This document is the Roadmap for Spain.

Through an analysis carried out in collaboration with different construction sector stakeholders, a series of relevant players in the energy renovation process towards nearly zero consumption buildings was identified. A series of gaps and barriers preventing this renovation was identified for each player. Finally, a series of actions has been defined to address these barriers.

2. INTRODUCTION

The NeZeR project promotes the implementation and smart integration of Nearly Zero Energy Building Renovation (NZEBR) measures and deployment of Renewable Energy Resources (RES) in the European renovation market. The scope of NeZeR refers to residential houses and dwellings. The specific types of residential housing have been selected in each of the five partnering countries in order to choose the most important types of national housing.

The aim of the project is to make NZEBR the prevailing means for refurbishment and improve the performance of existing residential building stock, decrease the energy use of building stock, achieve significant emission reductions in the building sector, and decrease the non-renewable energy dependency of Europe.

To facilitate the implementation of NZEBR and uptake of RES, roadmaps for NZEBR and RES will be created. The focus countries are Finland, Romania, Spain, Sweden, and The Netherlands. This report presents the roadmap for Spain.

The roadmaps include general descriptions of how to achieve mainstream NZEBR and utilisation of RES from the perspectives of different stakeholder groups: city authorities, property owners and housing associations, construction sector (architects, developers, component producers), and user perspective. However, each country has had to select the most important stakeholders from their respective conditions.

2.1. Purpose of the Roadmap

The purpose of the roadmap is to complement the action plans developed in the NeZeR WP4 by specifying the actions various stakeholders need to take to make NZEBR the prevailing means for renovation. The roadmap may contribute to achieving the EU targets for existing buildings, mainstreaming NZEBR in the NeZeR countries and enable implementation of the action plan by guiding the stakeholders.

This Roadmap is a guide to help the different stakeholders to implement Action Plans. Furthermore, its aim is to promote, facilitate and accelerate renovation activity and strategies of residential buildings towards nearly zero energy consumption to achieve the following specific targets by 2020:

- the prevalence of energy renovation of residential buildings towards zero energy consumption over traditional renovation;
- improve the existing residential building stock;
- reduced energy consumption of the residential building stock;
- significant reduction of emissions from the building sector; and
- lower European dependence on non-renewable energy.

2.2. Methodology

In general terms, a roadmap can be described as a strategic plan outlining the steps required to attain stated outcomes and goals. In this project it includes action tasks and priorities for action and suggestions for metrics enabling progress tracking towards the final goals. The tracking process will commence on finalisation of the NeZeR-project.

Given that the NeZeR project is aimed at residential buildings, prior to this Roadmap preparation, an analysis of the different residential types in each of the five countries taking part in the project was carried out. After the analysis, the most frequent and repeatable residential type which best addressed the typical characteristics of each country was selected and defined.

The roadmap development process has been divided into the following phases:

- Planning and preparation
- Drawing up a roadmap document
- Review and consultation with key stakeholders
- Roadmap tweaking and launching

To ensure the Roadmap achieves its purpose and responds to the needs of the sector addressed, different experts and key sector stakeholders who are part of the national cluster of the NeZeR project were contacted in this preparation process. A national workshop was specifically organised in each participant country to collect inputs from each national cluster, in order to develop the Roadmap. After the workshops, the resulting data and conclusions were collected to be discussed with the different players in interviews.

The different renovation value-chain players are the stakeholders in the market of NZEBR.

Workshops were devised to offer key players suitable conditions to discuss the matter and offer their input in the most natural objective manner, to prevent guiding those players at all times.

The methodology implemented to identify actions for the different value chain key stakeholders, as well as its impact and indicators for future monitoring are shown in the following figure:

	GAPS AND BARRIERS	ACTION ITEMS	IMPACT	INDICATOR
Government				
Authorities				
Municipal Decision Makers				
Architects, Designers and Consultants				
Larger property Owners (Municipal)				
Construction Companies				
Tenants				

Figure 1. Example of roadmap matrix.

2.3. Scope and boundaries (and connection to other NeZeR WPs)

The roadmap has been drawn up on a national level, from the perspective of different stakeholders, previously identified in WP5 (Impact through national clusters). The roadmaps also take into account the technical, functional, and economic aspects, addressed within WP2 (Criteria for NZEBR technologies and solutions) and WP3 (Feasibility of NZEBR over traditional renovation).

Results from WP2 and WP3 on technical and non-technical aspects have been kept in when developing the roadmap. The roadmap provides recommendations on future actions for different stakeholders with special attention to the challenges and non-technological barriers for NZEBR and RES identified for different stakeholder groups.

The roadmap differs from the city action plans (WP4) in the sense that they focus on the stakeholder perspective including the individual perspectives of different stakeholders. The Action plans in WP4 were developed for the cities, whereas the roadmaps have been drawn up on a national level and include different stakeholders. Nevertheless, the action plans have been used as input for creating the roadmaps.

2.4. Identified stakeholders

NeZeR is a dissemination project and one of the project tasks includes the identification of key stakeholders who make up the building renovation value chain for the dual purpose of: managing dissemination activities customised for each stakeholder according to their needs and competences; and to include their input in the document preparation.

The most important key players to be included in the Roadmap have been defined on the basis of the analysis of key stakeholders carried out in task 5.1 of the NeZeR project.

The list of most relevant stakeholders identified in Spain is as follows:

- Building owners and tenants
- Building component manufacturers
- Municipal decision-makers
- Planners: Architects, designers and technical consultants
- Construction companies
- Research companies
- Energy agencies

As already mentioned in previous sections, the participants of the NeZeR cluster were invited to attend a workshop to develop this Roadmap. Therefore, the profiles identified were involved in the development of this Roadmap.

3. BASELINE

3.1. Current situation, building stock, energy use

Directive 2010/31/EU (EPBD) regarding energy performance of buildings states that existing buildings undergoing integral renovation must meet minimum energy requirements. Renewable energy generation must be included if technical, functional and financial conditions permit it. The EPBD has led to the development of national building regulations and standards for building energy performance calculation and building certification. Nevertheless, integral renovation aimed at achieving nearly zero energy consumption buildings have yet to get a foothold in the market.

Players launching and designing improved energy in buildings face several barriers of different categories which are identified in the BAREENERGY¹ 7FP European project. Financial barriers include low energy cost (to change public opinion) and the lack of reliable cost-effective products. Tenants and home owners' lack of knowledge regarding the use of energy and energy efficiency is yet another barrier. Prioritising comfort and high room temperatures inside buildings as well as personal advantages instead of pursuing environmental responsibility are examples of individual and cultural barriers.

Structural barriers include: the lack of feedback on the energy use; the lack of energy efficiency services; as well as organisational barriers related to the decision-making process by users. Political barriers involve insufficient co-ordination of initiatives, incentives and standards. Among them, NeZeR will focus on dealing with and overcoming knowledge-related barriers.

Energy-efficient renovation measures have been analysed in many projects. However, despite ambitious and major results, the information generated was simply collected in reports and was insufficiently distributed among the professionals.

Decision makers require greater knowledge of the energy efficiency advantages. That statement is applicable to both private and public decision makers. Currently, knowledge is only accessible to specialists and not globally disseminated to the general public. This situation needs to be resolved through the creation of accessible platforms containing up-to-date easy-to-access information which enable decision-making by decision makers and also the rest of stakeholders. Knowledge regarding the advantages of efficient action compared to inefficient activities may be a definite boost for more ambitious future renovation actions.

Current situation in Spain

Spain erected a vast amount of buildings between the 1950s and 1980s, due to a period of great industrial development. The buildings are all pre-regulation of the building industry; consequently, the Spanish building stock erected during this period is of poor quality and highly inefficient energy-wise (the first envelope insulation was approved in 1979). Due to this and together with the current building sector crisis, a significant transformation of the Spanish residential building stock has become a target of the recent construction policies in Spain. In fact, energy efficiency and building renovation are the two main priorities.

Regarding the need for rehabilitation, there is a large residential building stock in Spain that needs renovating. According to the results of the SECH SPAHOUSEC project the Spanish building stock is mainly composed of block of flats (70%) which are usually located in high density urban areas. Previous works undertaken by TECNALIA have classified the buildings

types in Spain. Among them, the three most interesting types regarding energy efficiency renovation opportunity are: Buildings from the beginning of the 19th century, Social Housing (1940 – 1964) and City expansion buildings (1970).

The different constructive schemes of these three building types and the socio-economic condition of the tenants cover a broad spectrum of conditions, resulting in the need to define different intervention strategies that could later be implemented on a large scale.

Spanish Social Housing is characterised by groups of identical free standing buildings located near the suburbs of industrial cities. They are commonly very poor quality dwellings, built with easy-to-obtain cheap building materials and systems. Some of their characteristics are: ground floor + three or four floors, pitched roof with ceramic tiles, double brick façade without insulation, mortar based envelope painted without decoration, no balconies and no verandas, basic windows with single glazing and without air tightness, heating, insulation, or a lift, habitability problems (small dwellings) and very high socio-economic vulnerability as there are families with serious income problems, low knowledge and education levels.

The buildings consist mainly of prefabricated concrete elements and are poorly insulated. Studies show that the energy consumption in these buildings is nearly 40% higher than in newly built buildings. The major renovation needs are mostly maintenance work on façades and roofs as well as renovation of the ventilation system. These structural elements have a direct impact on energy consumption and can provide direct benefits in terms of energy. In addition to these direct energy impact actions there is also a great need for the renovation of lifts and sewage drains.

3.2. Policies and incentives

To meet the European objectives, the Spanish Government designed three energy efficiency action plans (PAEE) with the following frequency: first PAEE 2008-2011, second PAEE 2012-2014 and third PAEE 2015-2016. The transposition of European directives is related above all to buildings of new construction.

At national level, the transposition of directive 2002/91/EC concerning the energy efficiency of buildings in the case of renovation is still pending. This delay has resulted in a loss of opportunity with regard to the quality of the interventions carried out in the last decade in the field of rehabilitation.

At present, a review of the Spanish Building Technical Code, incorporating the new requirements of the directive as well as the establishment of a sanctions regime ensuring fulfilment of the energy efficiency requirements is still needed. With reference to the promotion of renewable energies, the 2009/28/EC Directive experienced a significant delay in its implementation, which should have been completed in December 2010. The first step was the preparation of the National Action Plan for renewable energies (PANER 2011 -2020), which was finally approved in November 2011, and now requires additional measures and regulations. This strategy will be reinforced with the new Action Plan for energy efficiency, 2011-2020, to improve the synergy between the two key cornerstones of energy policies, supply and demand of energy: renewable energy and energy efficiency, which will facilitate the achievement of a more efficient sustainable energy model in Spain.

For the NeZeR project the national definitions will be used as the basis for setting and evaluating the ambition levels for the renovation projects analysed. These will be compared to the interpretations of NZEBR developed in the ZEnN project.

Results from the analysis (energy, LCA, LCC, CBA) performed in the NeZeR project will be used to provide input on the applicability of the national definitions. This could also be used as an input for future adjustment of the national criteria.

4. ROADMAP

4.1. General gaps and barriers for NZEBR

Nowadays there is strong support for the promotion of energy renovation towards nearly zero energy consumption buildings from Europe. Nevertheless, we still encounter many different problems jeopardising the achievement of targets.

Financial issues as well as decision-making factors play a major role when it comes to implementing this type of action.

Regarding privately-owned or mixed ownership (private-social) multi-family residential buildings, the toughest bottleneck is investment financing required for action implementation as well as the decision-making process regarding whether the action is taken or not. In addition, the need to reach an agreement among a large number of home owners with different and specific socio-economic and cultural situations in each case must also be taken into account. The higher the initial investment is, the greater the difficulties to implement the action will be. Measures to improve energy efficiency in buildings result in very long-term return on investment times which in some cases exceed ownership turnover periods of buildings.

In NeZeR project (WP2), the existing gaps and barriers which are slowing down and preventing energy renovation of buildings towards nearly zero energy consumption have been identified and analysed. This identification of gaps and barriers has been carried out in each country, based on the contents of the document *D3.3 “Proposal of relevant fiscal incentives and other control instruments for supporting NZEBR”*.

In the case of Spain, main stakeholders involved in energy renovation underline several bottlenecks when undertaking energy rehabilitations, despite the tax incentives. Moreover, these barriers gain importance when facing Nearly Zero Energy Renovation. Barriers can be categorised in the following five main groups:

1. Lack of knowledge and awareness. Society is not aware of the advantages of energy renovation and they will not execute NZEBR unless there are tax incentives. Tenants do not feel the necessity for energy renovation and they are unaware of existing technologies and their advantages. Regarding professionals, the lack of knowledge regarding existing technologies and the difficulties to implement proper energy renovations result in a reduction of the number of interventions.
2. Economic barrier. The high cost of innovative technologies to reduce consumption and production of renewable energy becomes an important bottleneck regarding energy rehabilitation. Additionally the income of tenants is a critical aspect which decides whether the rehabilitation can be executed. Although tax incentives facilitate the decision, they are often insufficient for final acceptance. Therefore, economic strategies, together with technical solutions should be considered.
3. Social barrier. Low income coupled with the difficulties of reaching an agreement among tenants becomes a strategic issue to undertake an energy renovation project. Due to warm climate conditions in Spain, the thermal requirements are less demanding in relation to Northern and Nordic countries. Therefore energy rehabilitation is not a primary necessity for tenants.

4. Lack of organisation/implication of the administration/energy companies. There is no common strategy among organisations which might facilitate and promote the renovation process.
5. Current crisis situation uncertainty reduces both private and public investment in the renovation field and critical rehabilitations (e.g. structural retrofitting) are prioritised.

Overall gaps and barriers for NZEBR have been previously identified in NeZeR WP2 as:

Currently, there is a strong support to promote NZEB renovation projects around Europe. However, there are still numerous causes of different origin making it difficult to reach this target.

Economic aspects as well as the decision making process play a relevant role when undertaking NZEB renovation projects.

For multifamily buildings involving private or mixed (private and social housing) ownership, the decision-making process and financing of investments are a major bottleneck. The higher the initial investment the more difficult the intervention is. Energy efficiency improvement measures are related to long term planning and ownership turnover cycles are often shorter than the payback period for the measures.

4.2. Action Plan for different stakeholders

The purpose of this Action Plan is to offer recommendations and future actions for the different stakeholders. Actions are steps to be taken to overcome the barriers identified.

The Action Plan for Spain was defined through different workshops and interviews with the stakeholders. This Action Plan has been summarised in the following table and the Action Plan for each key stakeholder group is described below:

In this section we are using the results from D3.3 “Proposal of relevant fiscal incentives and other control instruments for supporting NZEBR” (Country-specific conclusions and suggestions for further actions), see below. D.3.3. is not a complete list of action points but can be used as a basis. See also D2.1 and D2.3 and check the results of earlier workshops.

Stakeholders selected in previous deliverables	GAPS AND BARRIERS	ACTION ITEMS	IMPACT	INDICATOR
Building owners / Tenants	<ul style="list-style-type: none"> • Can't raise rent or dwelling value • Lack of awareness and knowledge • Economical vulnerability 	<ul style="list-style-type: none"> • Rent+dwelling value related to Energy qualification • Awareness EE • Subsidies 	<ul style="list-style-type: none"> • Upscaling of energy renovations • Tenants satisfaction • Habitability/Improvement 	<ul style="list-style-type: none"> • Upscaling of NeZeR interventions
Building component manufacturers	<ul style="list-style-type: none"> • Unjustifiable payback periods • No technical solutions for all rehabilitation particularities 	<ul style="list-style-type: none"> • Awareness about EE interventions advantages • Development and testing of particular solutions 	<ul style="list-style-type: none"> • Upscaling of energy renovations • Upscaling of manufacturers business 	<ul style="list-style-type: none"> • Upscaling of products & systems & particular solutions towards NZEB renovations • Lower prices for these products
Municipal decision-makers	<ul style="list-style-type: none"> • Limited influence (4 years) • Lack of integral involvement • Undemanding legislation 	<ul style="list-style-type: none"> • Facilitate awareness • Propose new strategies and policies • Toughening up legislation 	<ul style="list-style-type: none"> • Operative legislation • Upscaling of energy renovations • Energy renovations quality 	<ul style="list-style-type: none"> • Upscaling of NeZeR interventions
Planners	<ul style="list-style-type: none"> • Lack of know-how • Difficulties to achieve NZEB due to existing building features 	<ul style="list-style-type: none"> • Facilitate awareness • Training and information 	<ul style="list-style-type: none"> • Good quality plans and projects for NZEBR 	<ul style="list-style-type: none"> • Upscaling of NeZeR interventions • Energy and cost savings • Quality of NeZeR projects
Construction companies	<ul style="list-style-type: none"> • Lack of know-how 	<ul style="list-style-type: none"> • Facilitate awareness • Training and information 	<ul style="list-style-type: none"> • Upscaling of energy renovations • Quality of NeZeR renovations 	<ul style="list-style-type: none"> • Upscaling of NeZeR interventions • Energy and cost savings • Quality of NeZeR interventions
Research Companies	<ul style="list-style-type: none"> • Considerable gap between investigation and market 	<ul style="list-style-type: none"> • Increase collaboration and feedback actions with the market 	<ul style="list-style-type: none"> • Overcoming of death valley of innovation activities regarding EE renovation 	<ul style="list-style-type: none"> • Upscaling of innovative solutions and strategies that reach the market
Energy agencies	<ul style="list-style-type: none"> • Particular interests • Lack of involvement 	<ul style="list-style-type: none"> • Increase communication between Energy agencies and other stakeholders 	<ul style="list-style-type: none"> • Upscaling EE knowledge of all the stakeholders 	<ul style="list-style-type: none"> • Upscaling of NeZeR interventions

4.2.1.- Building owners and tenants

Gaps and barriers:

In Spain, home energy rating is not currently linked to the value of properties. Therefore, home owners cannot increase the rental or sale value of their property in this respect. As a result, they fail to see a direct tangible financial return from the whole action.

There is a major lack of awareness regarding energy efficiency in Spain.

There is also a substantial lack of knowledge regarding the advantages of energy efficiency and disadvantages of energy inefficiency.

Social participation on the whole is low.

Actions:

Home Energy Rating (HER) must have an impact on the appreciation in value of properties.

Awareness raising as well as public information distribution campaigns should be launched.

Impact.

If HER was taken into account for the appreciation in value of properties, a more efficient residential building stock could be achieved with a major improvement in comfort and habitability conditions.

The impact of awareness campaigns would result in greater public awareness regarding energy efficiency in general and not only help in decision-making regarding energy renovation initiatives but also in the implementation of renewable energies not to mention energy management and use at homes.

Indicator:

An indicator would be a formula associating the energy rating of buildings and homes with the rental or sale price.

A public awareness indicator would be the rise in the number of energy renovations performed per year in residential buildings.

4.2.2.- Building component manufacturersGaps and barriers:

The most efficient innovative products which can be used in new buildings are difficult to adapt in renovation projects.

Return on investment times are long-term and hinder justification of renovation action based on financial savings calculations.

Actions:

The development of solutions to adapt the different systems to existing buildings is considered necessary.

In addition the inclusion of indicators and advantages, as well as return times, in the awareness plan is also needed. Those advantages may include: improved comfort and habitability, appraisal in value of the property, etc. The products to be sold or supplied must include technical, performance and use documentation clearly explaining the advantages derived from their use to all stakeholders (builder or installer and users).

Impact:

The implementation of systems in energy renovation projects, together with the encouragement of this type of projects, will imply a business boost for product manufacturers.

Indicator:

Number of annual sales of products or systems for energy renovation of buildings.

4.2.3.- Municipal decision-makersGaps and barriers:

Firstly, Regulations are not considered very strict and the results of non-compliance are weak. There is also a lack of involvement from policy-makers who define policies and make decisions as their influence span is 4 years.

Actions:

Updating Regulations to enforce their compulsory application in renovation activities is necessary. The aim is for renovation projects to have the same importance as new building work.

Moreover, the Regulatory demands should be stiffer with more ambitious energy saving targets.

Furthermore, regulations should envisage the renovation of buildings towards nearly zero energy consumption, with a definition in terms of quantity of the "nearly zero energy" concept.

Finally, regulatory compliance monitoring methods including sanctions in the event of non-compliance shall be set forth.

Impact.

The long-term return of energy renovation, in particular taking into account Spanish climate is not as harsh as that of Scandinavian countries, means the financial factor lacks sufficient weight to motivate energy renovation works. As a result, regulations and compulsory regulatory compliance play a major role in promoting this activity. If Regulations were more demanding and stricter regarding compulsory compliance, a major growth would be seen in activities of this type, not to mention a significant energy efficient improvement in Spanish building stock.

Indicator:

Number of energy renovation projects per year.

4.2.4.- Planners

Gaps and barriers:

The main gap identified is a lack of specific know-how on nearly zero energy buildings. Although more and more building developers and professionals are increasingly aware of and specialised in the matter, in fact the vast majority associate energy renovation with thicker insulation, woodwork replacement or upgrading of installations. Although those measures improve the efficiency of existing buildings they are insufficient if the target is to achieve nearly zero energy buildings. In addition to this, the building sector in Spain has traditionally been mainly focused on new buildings. The crisis experienced by the sector in recent years has geared this activity towards renovation resulting in a high percentage of building developers with significant experience in new buildings but no specific renovation knowledge. In addition, building developers and professionals face difficulties to achieve nearly zero energy buildings through the renovation of existing ones. While new buildings allow greater design freedom, existing buildings entail a series of conditions in reality which are impossible to modify. In addition to this, the majority of new technologies include already tested solutions for new buildings whereas their adaptation to the specific scenarios of existing buildings are neither defined nor tested.

Actions:

The main action to overcome the barriers described is the implementation of training activities. Training should be aimed at building developers, planners and designers, offering them the necessary tools and knowledge to encourage them to undertake ambitious energy renovation projects to obtain nearly zero energy buildings as much as possible. Training activities must be as accessible as possible to reach the highest number of professionals, so that energy efficiency and nearly-zero energy targets become a central part of every renovation project.

On the other hand, industrial companies developing and marketing energy renovation products must include building developers and professionals in their product development stages, to identify the needs which will enable the definition of a final product in agreement with the same. Greater contact and communication among industry professionals and building

developers and professionals will also provide greater knowledge regarding existing market solutions.

Impact.

Implementing the actions described will increase the number of energy renovation on the one hand. In addition, energy renovations may be more ambitious from the energy point of view and ultimately project quality will improve.

Indicator:

Four indicators provide a measurement of the impact of the implementation of the measures described:

- increased number of energy renovation projects per year;
- greater efficiency ambition in energy renovation projects;
- energy and cost saving;
- improved quality in energy renovation projects.

4.2.5.- Construction companies

Gaps and barriers:

The main barrier for building companies to accomplish building renovation projects towards nearly zero energy buildings is the lack of specific knowledge on the matter. As construction companies work is very oriented to project costs, builders are reluctant to implement solutions unknown to them and entailing a certain degree of uncertainty which may lead to possible price target deviations.

Furthermore, building companies are also unwilling to install systems which have not been widely tested, to prevent possible problems or future pathologies, as they will have to address them in the future.

Actions:

Actions to be implemented to overcome the barrier described involve knowledge and training activities. As well as facilitating technical information on technical solutions and their execution, these activities will include a major analysis of the advantages derived from the implementation of advanced innovative systems, as well as from energy renovation towards nearly zero energy buildings. The aim is for building companies to conceive renovation projects as business opportunities and a differentiating factor in relation to their competitors, so they decide to undertake certain risks enabling them to evolve along this route.

Impact.

The training initiative described will result in a higher number of energy renovation projects towards nearly-zero energy consumption buildings. Likewise, the performance quality of the projects will improve so they are faster and yield reduced costs. Furthermore, an increase in the use of innovative solutions will enable price reduction.

Indicator:

Four indicators provide a measurement of the impact of the implementation of the measures described:

- a greater number of energy renovation projects per year;
- energy and cost saving;

- improved quality of energy renovation projects and their performance; and
- increased use of innovative solutions and reduced prices.

4.2.6.- Research companies

Gaps and barriers:

The main barrier existing for research centres is the huge gap between their research activity and the market activity. The lack of contact between research centres and universities with the market makes it difficult for market launching of the breakthroughs achieved. This situation need to be solved for the breakthroughs achieved to bridge the "valley of death". In addition, research centres often develop solutions which fail to directly resolve the needs demanded by the market.

Actions:

Action to be taken is based on boosting collaboration among research centres and market players. On the one hand, testing the breakthroughs carried out in the market is necessary, so they respond to real needs. The collaboration among them will also offer the market greater knowledge of the research initiatives carried out in both the near and distant future. In this way, the different market players will have wider and more open technical knowledge.

Impact.

Implementing the action described will achieve research activities undertaken are more in line with real market needs. This will enable breakthroughs obtained to bridge the "valley of death" of innovation and to be implemented in the market. In this way, a higher number of building developers and professionals will use innovative solutions in their projects and building companies will carry them through. Therefore, the price of innovative projects will be more accessible and enable their popularisation.

Indicator:

A greater number of innovative solutions in the market;

- a greater number of innovative solutions used by project developers in energy renovation projects; and
- a greater number of innovative solutions implemented by construction companies; and
- reduced price of new and innovative solutions.

4.2.7.- Energy agencies

Gaps and barriers:

The main barriers for energy agencies are on the one hand their specific interests which may hinder certain developments; and on the other hand, the lack of involvement in market reality.

Actions:

The main action to be taken is based on increasing communication between Energy Agencies and other players who are part of the energy renovation value chain.

Impact.

This action, as well as facilitating greater involvement by agencies will also increase knowledge on the matter for the different stakeholders.

Indicator:

The action described will increase the number of NZERB projects.

4.3. Priorities and Deadlines

A list of tasks to be carried out as a result of the actions described in the previous section is included below. These tasks are organised in order of decreasing priority and divided into short, medium and long terms.

Subjects	Priorities	Short-medium term 2017-2018	Medium-long term 2019-2020
Awareness	Define an activity plan for public awareness regarding EE in buildings	X	
	Implement the Awareness Plan defined	X	X
Training	Define a specific Training Plan for each player involved in the building energy renovation value chain.	X	
	Implement the Training Plan defined. Make the most of the opportunity of training activities for different players to meet and convey knowledge.	X	X
	Organise workshops for innovative system implementation provided by product manufacturers for the rest of stakeholders (project developers and designers and building companies).	X	X

Dissemination	Development of a Dissemination Plan enabling property value to be associated with Home Energy Rating (HER).	X	X
Regulatory Update	Update the Technical Documentation Plan of building products to include Energy Efficiency related issues.	X	
	Update building Regulations to ensure Renovation and Energy Renovation take a more central role including Nearly Zero Energy Building concepts and actions.	X	X
	Develop a Regulatory Compliance Control Plan	X	X
	Develop a more operational and accessible Subsidy Plan for energy renovation towards nearly-zero energy buildings (and ensure its dissemination)	X	
Networking-collaboration activities among different bodies and stakeholders.	Define a Collaboration Plan among Research Centres and different stakeholders who are part of the building energy renovation value chain.	X	
	Plan Implementation		X
	Define a Collaboration Plan among Energy Agencies and different stakeholders who are part of the building energy	X	

	renovation value chain.		
	Plan Implementation		X
Monitoring and revision	Definition of a Monitoring Plan of the actions defined	X	
	Implementation of the Monitoring Plan defined, indicator revision, preparation of conclusions and definition of next steps.	X	X

5. ROADMAP IMPLEMENTATION

The process of implementation of this Roadmap is ongoing and based on continuous improvement. Different kinds of tasks have been included in this Roadmap. Some of those tasks are easy to implement while others are more complex and their implementation implies policy actions which are not easy to manage in the short term.

The Roadmap Implementation Plan begins with dissemination activities in order to facilitate its scope reaches sufficient strength to address the rest of more complex tasks.

Firstly, the Plan will be distributed among the different sector agents nationwide and who are part of the NeZeR project cluster in Spain. Likewise, the Plan will be disseminated among the contacts of different stakeholders who take part in other local, national and European projects related to this matter such as: CERTUS, ZENN, PAPIRUS, A2PBEER, ZEBE, REHABITA, etc.

The NeZeR Roadmap will also be disseminated in activities of different kinds undertaken with different municipalities nationwide.

Presence at different conferences and events will be maximised to continue disseminating the Plan and obtaining feedback from the different stakeholders which will facilitate updating and improving the roadmap through time.

The Roadmap will be advertised and published on Tecnalia website and Sestao Berri will introduce the Roadmap in its calendar of events.

A revision of the Roadmap is proposed at internal Tecnalia level at the end of the short-medium term defined in the priority table of the previous section, i.e. in 2018. Furthermore, another revision within the period defined as medium-long term will be carried out, i.e. in 2020. Nevertheless, as we have already mentioned, the Roadmap will be used in different activities in forthcoming years. Every time the Roadmap is used, for dissemination and as a document where other developments related to this matter may be based, it will be reviewed and updated. A calendar of activities cannot be defined beforehand as it depends on different projects, activities and teams.

6. CONCLUSIONS

An analysis of the current energy rehabilitation situation towards nearly zero energy buildings was carried out to draw up this document. This analysis was prepared taking into account input from different sector players. As a result of the analysis, a major identification of the current situation of gaps and barriers related to this activity nationwide has been achieved and a series of actions of different nature has been defined to address them. The conclusions combine different points of view from the different players who took part in the analysis.

The most relevant final conclusions of the analysis are described as follows:

- There is a major lack of awareness regarding energy efficiency in general, energy efficient buildings and in particular, nearly zero-energy buildings.
- The main hurdles to address energy rehabilitation of buildings towards nearly zero-energy buildings are:
 - Lack of awareness
 - Lack of knowledge
 - Lack of political involvement
 - Unattractive investment returns
 - Lack of financial resources
- Nowadays overcoming these barriers in a single short-term phase seems unthinkable; therefore, the design of a two-phase (short-medium and medium-long terms) plan becomes necessary.
- Although there are several actions aimed at overcoming the abovementioned hurdles, a series of key actions which would solve the rest of them were identified. These key activities are:
 - Popular awareness-raising plan: On the basis of this popular awareness-raising exercise, the energy efficiency of households and buildings will be assessed, resulting in an increase in the number of energy rehabilitation initiatives. In time, this will mean an appreciation in property values based on their Energy Rating.
 - Specialised Training Plan: On the basis of an increase in the technical knowledge of planners and builders, the number of energy rehabilitation initiatives will grow. This will mean an enhancement of quality, completion times and price of rehabilitation work. Moreover, the use of new and innovative systems and solutions will increase, resulting in price optimisation.
 - Plan to ensure contact and communication among the different players: Communication among the different players will yield better knowledge of each player, leading to a more functional way of working. Moreover, contact among Research Centres and other players will ensure research is useful and aligned with the real market needs. In turn, this will act as a catalyst for the implementation of new breakthroughs in the market.

- Development of a policy towards nearly zero-energy buildings which will include standards in line with the targets, as well as a standard compliance control plan. This policy will also cover subsidy operational plans.

7. REFERENCES

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