BUILD UP SKILLS

ENERGY TRAINING FOR BUILDERS

Spain

National Roadmap
"Construye 2020"

Marzo 2013

FUNDACIÓN LABORAL DE LA CONSTRUCCIÓN

INSTITUTO NACIONAL DE LAS CUALIFICACIONES

AIDICO INSTITUTO TECNOLÓGICO DE LA CONSTRUCCIÓN

GOBIERNO DE ESPAÑA MINISTERIO DE FOMENTO

The responsibility for the content of this publication, etc., lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission is responsible for the use that may be made of the information contained therein.

Additional Information

More details of the BUILD UP Skills Spain Project can be found at http://spain.buildupskills.eu/

More details of the BUILD UP Skills Initiative can be found at www.buildupskills.eu

More details of the IEE Program can be found at http://ec.europa.eu/intelligentenergy

This roadmap has been prepared by the following team:

FUNDACIÓN LABORAL DE LA CONSTRUCCIÓN

Construction Labour Foundation:

- Ana González Martín
- Elena Novillo Ruiz
- Javier González López
- Puy Jiménez Fernández-Sesma
- Óscar Redondo Rivera (consultor)

GOBIERNO DE ESPAÑA MINISTERIO DE FOMENTO

Sub-directorate General for Innovation and Quality in Building of the Ministry of Development:

INSTITUTO NACIONAL DE LAS CUALIFICACIONES

National Qualifications Institute of the Ministry of Education, Culture and Sport:

AIDICO INSTITUTO TECNOLÓGICO DE LA CONSTRUCCIÓN

Technological Institute for the Construction - AIDICO

Collaborations of experts in the BUILD UP SKILLS SPAIN Platform

Índice

Pág.

0. Preface 5

1. Executive Summary 7

1.1 The building sector 7

1.2 National policies and existing provisions on energy and Professional Training 8

1.3 Quantitative data 8

1.4 Qualification needs and shortcomings in the building sector. . . 9

1.5 List of the priority measures identified to cover the detected needs and achieve the objectives 10

1.6 Action plan for the implementation of the actions identified. . . 12

1.7 Support to the roadmap by the competent public authorities and stakeholders 15

2. Introduction 20

2.1 Building sector 20

2.1.1 Activity *20*

2.1.2 Labour market *20*

2.1.3 Relationships with other sectors *21*

2.1.4 Economic contribution to GDP *21*

2.1.5 Supply chain *21*

2.1.6 Market trends and forecasts *21*

2.1.7 Major changes that affect it. *22*

2.1.8 Immigration and emigration. *23*

2.1.9 Shadow Economy *23*

2.1.10 Professional profiles involved *23*

2.2 National policies and existing provisions on energy and Professional Training. 24

2.2.1 National policies on energy *24*

2.2.2 Legal regulations on energy efficiency and renewable energies applied to building. *25*

2.2.3 National policies on professional training *26*

2.2.4 Legal provisions on professional training *26*

2.3 Quantitative data 31
2.3.1 Current number of workers in the building sector *31*
2.3.2 Current energy use in the country and in the building sector *33*
2.3.3 The country's energy objectives for 2020 + expected contribution of the construction sector *37*
2.3.4 Number of construction workers to be trained in each sub-sector / occupation for each level of competence to meet energy targets in 2020. . . . . . *45*
2.3.5 Qualification requirements: courses and itineraries required for the qualification, accreditation structures for conducting the training *49*

2.4 Identified barriers to achieve the 2020 targets 53
2.4.1 Economic barriers. *53*
2.4.2 Administrative barriers *54*
2.4.3 Structural barriers of the sector *55*
2.4.4 Educational and cultural barriers. *56*

3. Strategy and methodology for the development of the roadmap . . 57
3.1 Strategy 57
3.1.1 Introduction *57*
3.1.2 Status quo. *57*
3.1.3 Discussion group. *57*
3.1.4 BUILD UP SKILLS SPAIN Platform. E-communities *58*

3.2 Methodology 59
3.2.1 E-communities *59*
3.2.2 Results *60*

4. Actions Proposed for the Roadmap, Recommendations and Action Plan 90
4.1 Proposed Actions 90
4.2 Proposed Recommendations 150

5. Conclusions 162
6. Testimonials 164
7. References 165
8. Glossar 168
ANNEX I: Index of Figures 169

0. Preface

The development of the roadmap to qualify the construction workers, has been developed so as to get a skilled workforce in EE and RES for 2020 and it has been carried out with the participation of many relevant agents in both the construction sector and in the energy sector and in the professional training and qualifications.

The support of the roadmap has, in principle, all the institutions that have in some way participated in the development of the project:

These participants can be grouped into public institutions, social agents, construction associations, training centers...

The roadmap carries with it the support of each of the signatories so that in its scope field the implementation of the various actions contained is facilitated by **signing a letter of support**.

The scopes are:

Technical Scope

The support of the technical institutions aims to disseminate the project results and collaborate on the design and implementation of the actions and recommendations proposed in the roadmap.

Scope of the Worker's Representatives

The support of the trade union organizations representing the sector aims to spread information about the rehabilitation of buildings, among the workers, businesses and citizens, with efficiency criteria as a possible alternative in building to reach the 2020 targets.

On the other hand, they are committed to try to overcome the main difficulties of the workers to access training, which they will continue in the near future will be: lack of time, resources, lack of training supply and the economic situation.

The representatives of the workers will contribute to the dissemination of the training supply in the EE and RES areas, which is expected to increase over the next three years.

Similarly, they are committed to promote the professional qualifications of the workers.

Business Representation Scope

The support of this type of institution aims to spread information about the rehabilitation of buildings, among the workers, businesses and citizens, with efficiency criteria as a possible alternative in building to reach the 2020 targets.

On the other hand, they will try to overcome the main difficulties of access to training which they will continue in the near future as lack of time, resources, lack of training supply and the economic situation.

The business representation will contribute to the dissemination of the training supply in the EE and RES areas, which is expected to increase over the next three years.

Similarly, the recognition of the professional qualification of the employees, received through formal or informal channels, will be fostered between companies.

Scope of the Training Centers

The support of the training centers has as an object, the commitment to participate and disseminate the project's prospective data as well as collaborate and use the results of the observatory for prospecting the occupations and qualifications in the design of its training offer, in the EE and RES areas. They also agree to collaborate in the thematic expert networks to qualify the workers in the building sector in order to achieve the 2020 targets.

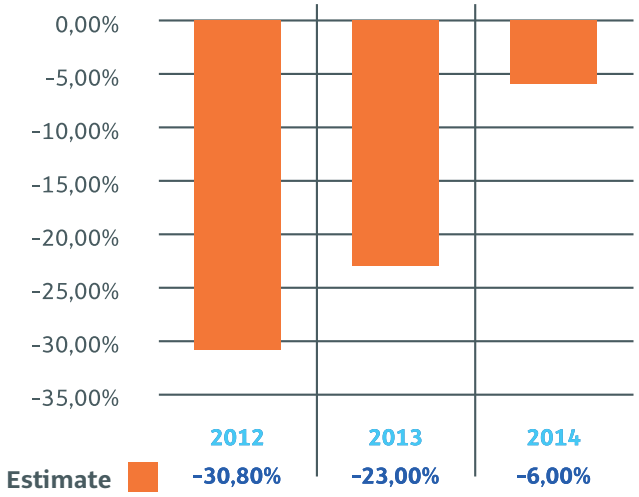
Institutional Scope

The commitment in this area is aimed at their participation in the dissemination of information to raise the awareness of the citizens and of the technical levels of these institutions. Similarly, they will facilitate the implementation of the recommendations made in the roadmap.

1. Executive Summary

1.1. The building sector

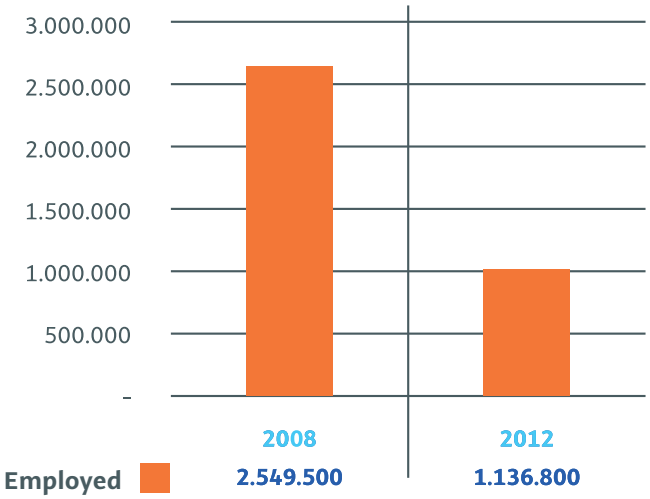
As described in the Status Quo Report and in the contextualization of the roadmap itself, and in the contextualization of itself the roadmap, the building sector is going through an extremely complicated time, with a drastic decrease in activity.



EUROCONSTRUCT foresees for Spain a significant contraction in production in 2013 to be somewhat less pronounced in 2014

Figure 1. Estimated growth of the construction sector.
Source: EUROCONSTRUCT

The decrease in activity has resulted in a dramatic decline in construction employment.



According to data from the Labour Force Survey of the National Statistics Institute more than 1,412,000 employed in the activity between 2008 and 2012 have been lost.

Figure 2. Decrease in construction from 2008 to 2012.
Source: INE

It should also be noted that the decrease in government spending, lower domestic investment, lower credits or the significant presence of shadow economy activity are factors that are affecting the building sector very negatively.

But, despite this difficult scenario, it is important to note that the construction sector as a whole contributed to the GDP by 8.5%, which indicates the key importance of this sector for the Spanish economy.

1.2. National policies and existing provisions on energy and Professional Training

There are both national policies and legal provisions on energy efficiency and renewable energy for building, although there are some legislative gaps, whose articulation, highly anticipated by various industry players, would encourage a demand stimulation that is seen as crucial to help reach the 20-20-20 targets. Several recommendations and actions of the roadmap seek to alleviate these issues.

The National System of Qualifications and Professional Training is developed and well articulated, although areas for improvement and the convenience of picking up new skills in the National Catalogue of Professional Qualifications are detected.

1.3. Quantitative data

Based on the evolution of the employment in the sector, the country's energy goals by 2020, the expected contribution of the construction sector and the investment associated to the rehabilitation of the building stock, the roadmap describes the number of construction workers to be trained to achieve the energy targets by 2020.

Thus, this analysis establishes the number of workers and trainers to train per year, based on a low, medium or high evolution of the building activities:

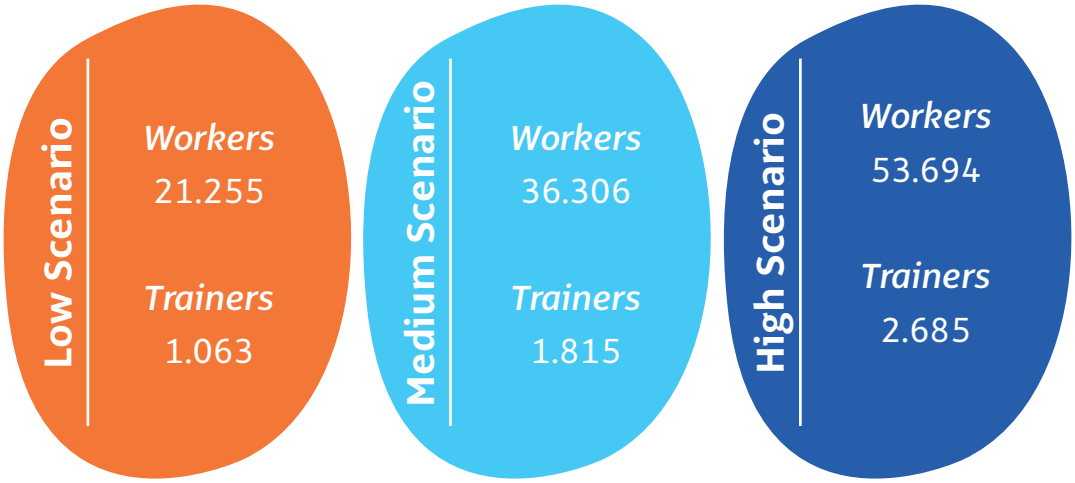


Figure 3. Estimate by workers' scenarios to train per year. Source: elaboración propia.

On the basis of this calculation, assuming that it is made, for the estimated workers with an average of **90 hours** of training per employee, given between 2013 and 2020, with an average cost of **11€** per hour, you get that you would have to spend **990€ on average** per employee, at least.

This involves an investment in training of between 28,135,181€ and 60,249,791€ per year, trend that would depend on the evolution of the building sector.

Note that the available data does not allow a definitive identification of the exact number of construction workers to be trained in every sub-sector or profession. One of the actions proposed for the roadmap, the training needs observatory, would contribute to bridge this gap.

1.4. Qualification needs and shortcomings in the building sector

According to the status quo analysis, the most important occupations in Energy Efficiency (EE) and Renewable Energy Systems (RES) with a greater need for training would be ten:

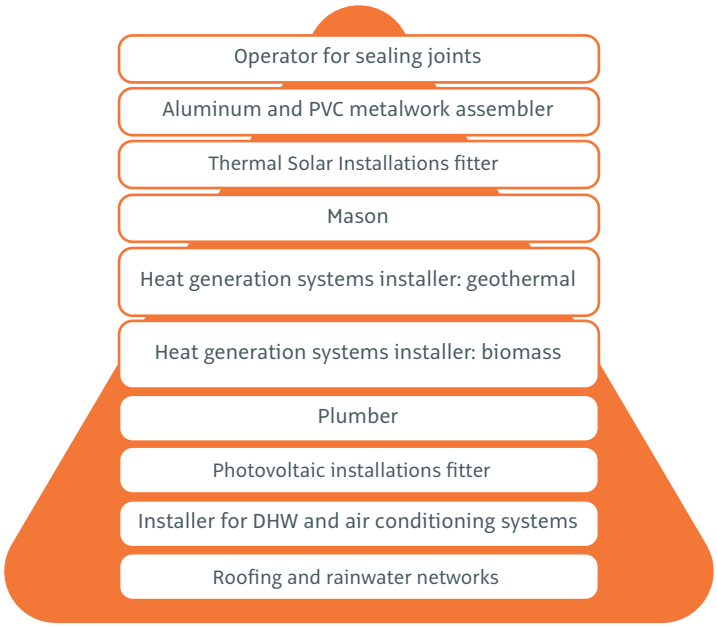


Figure 4. The most important building occupations in EE and RES with the greatest need for training. Source: statu quo.

Taking the above list into account, the competences that would require qualifications and training according to the Status Quo Report would primarily be the following:

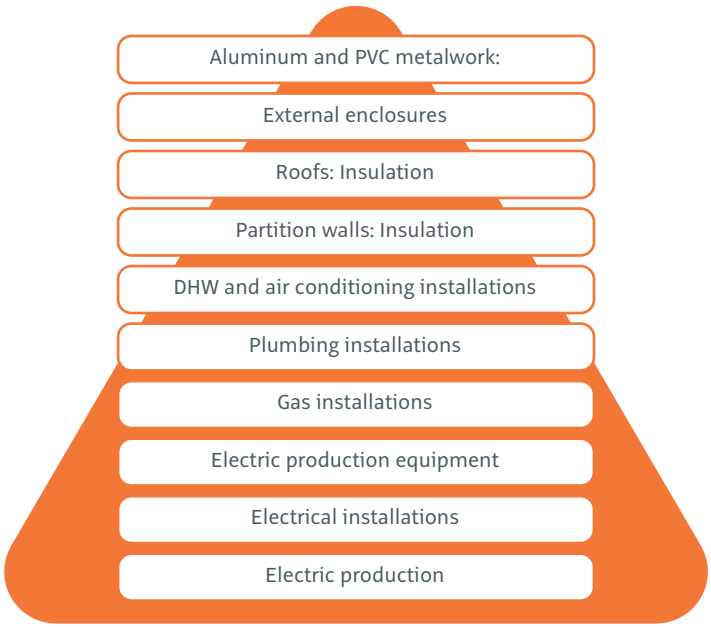


Figure 5. Competences with training needs. Source: statu quo.

1.5. List of the priority measures identified to cover the detected needs and achieve the objectives

The actions are shown in the following figures (29) and recommendations (11) identified as priorities:

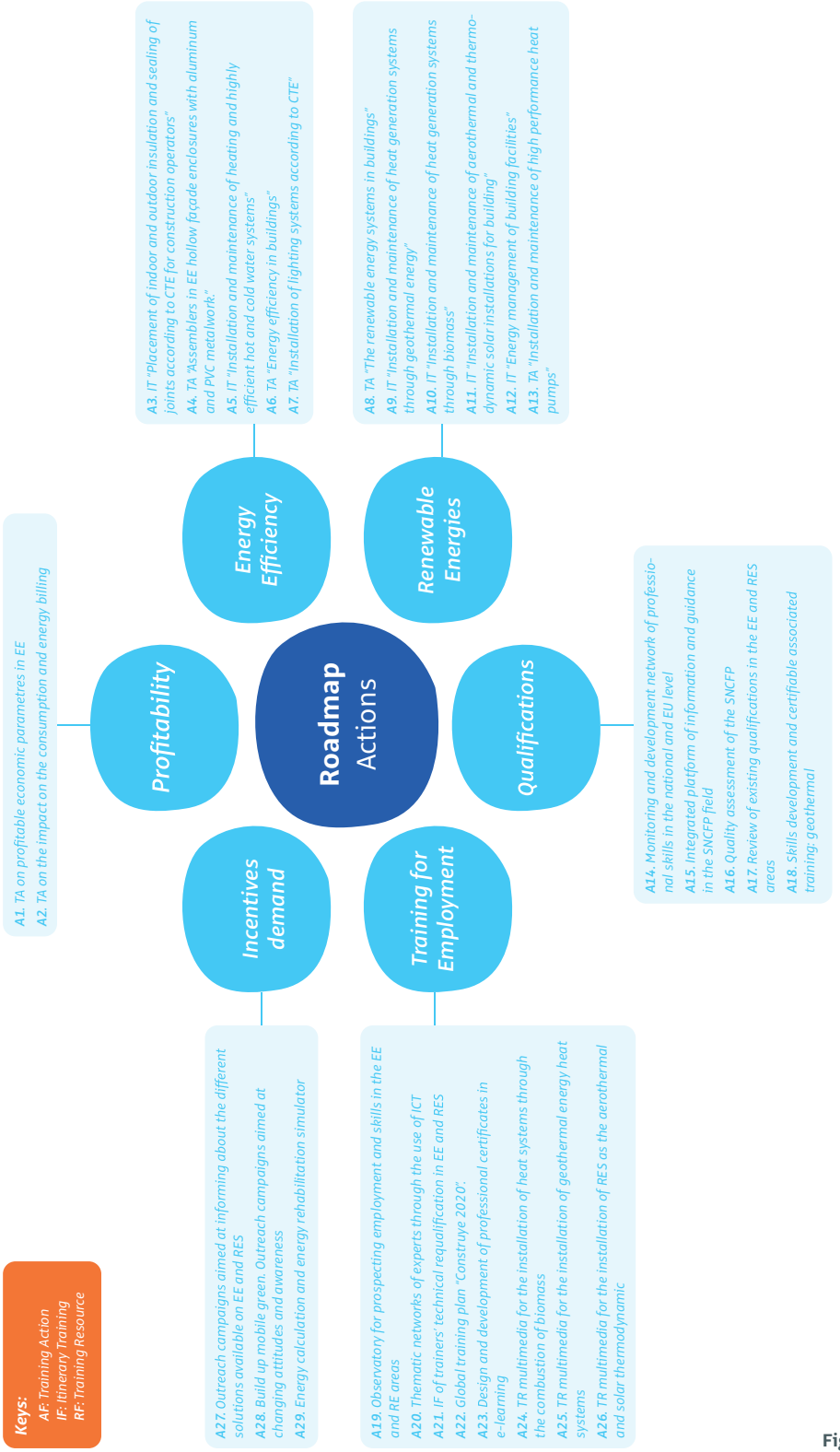


Figure 6. Roadmap actions

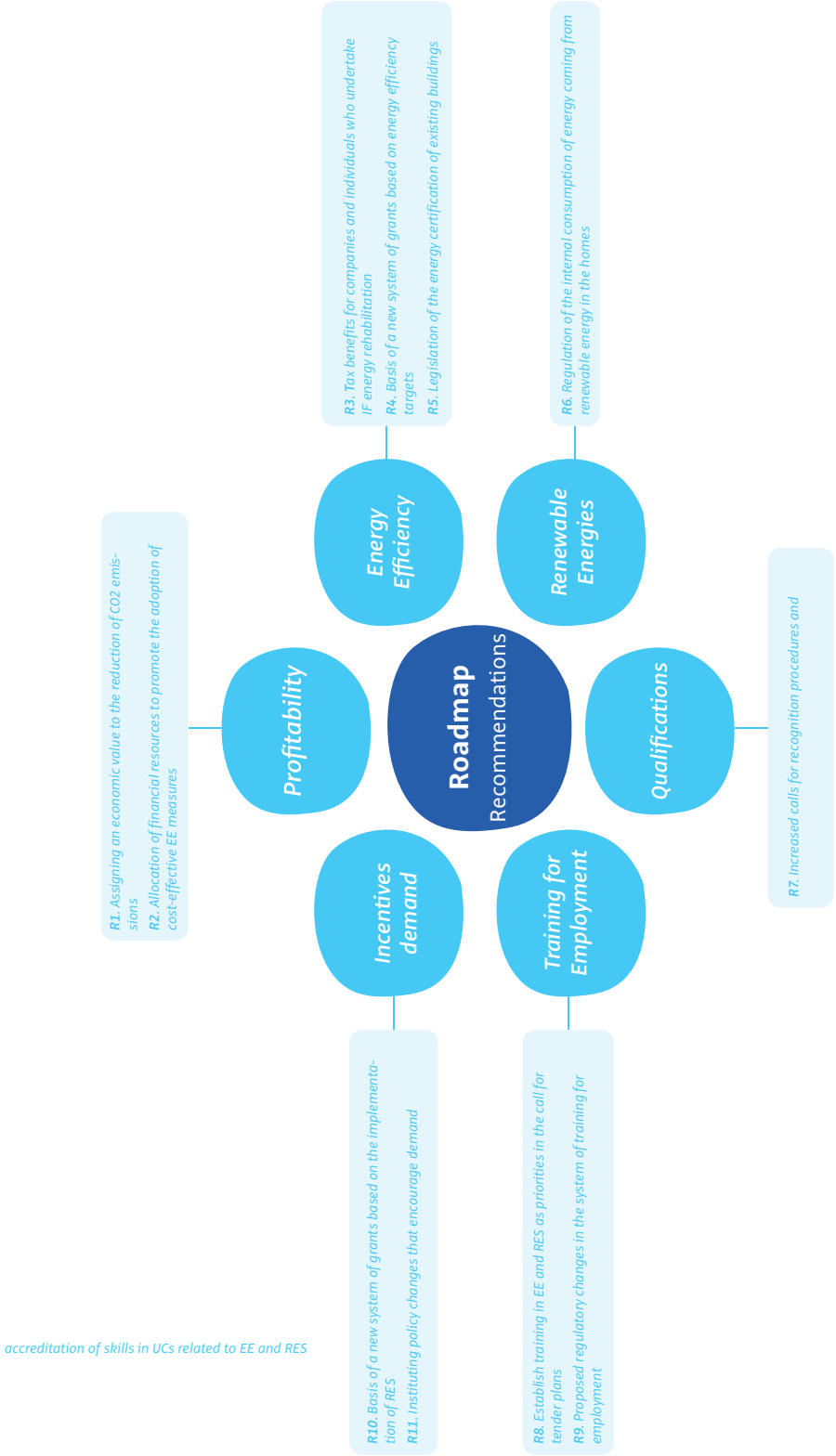


Figure 7. Roadmap recommendations

1.6. Action plan for the implementation of the actions identified

The action plan for the development and implementation of the roadmap has been built taking into account each of the action plans defined for each of the measures and proposed recommendations.

Thus, the first table shows the timing of the actions of the roadmap and the second the proposed recommendations. Both tables use the following color code:

RED: quarter predicted to start the action or proposed recommendation.

YELLOW: term considered for implementing or developing the proposed action or recommendation.

GREEN: estimated time for the effective implementation of the proposed action or recommendation.

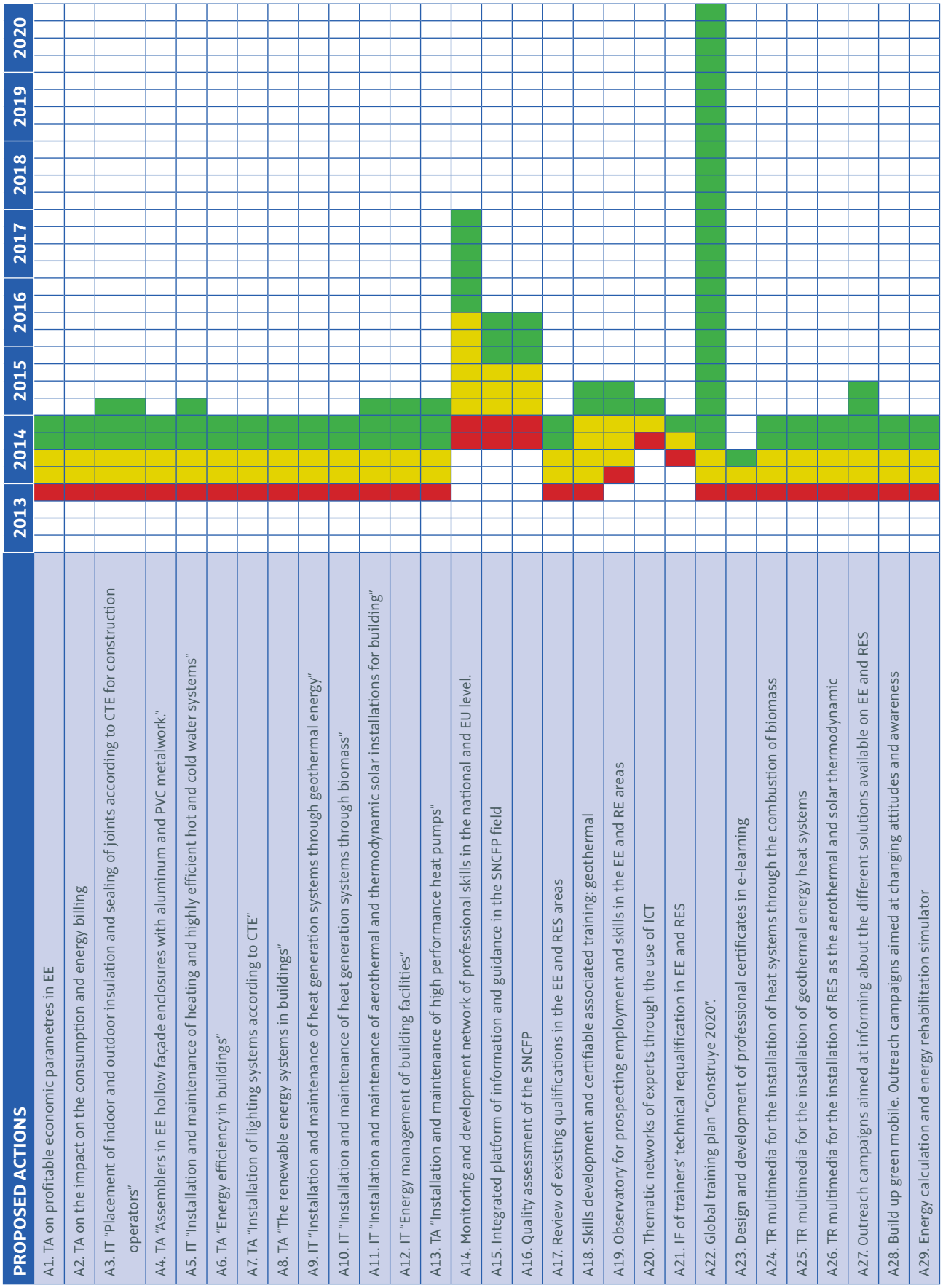


Figure 8: Action plan for the implementation of the actions of the roadmap

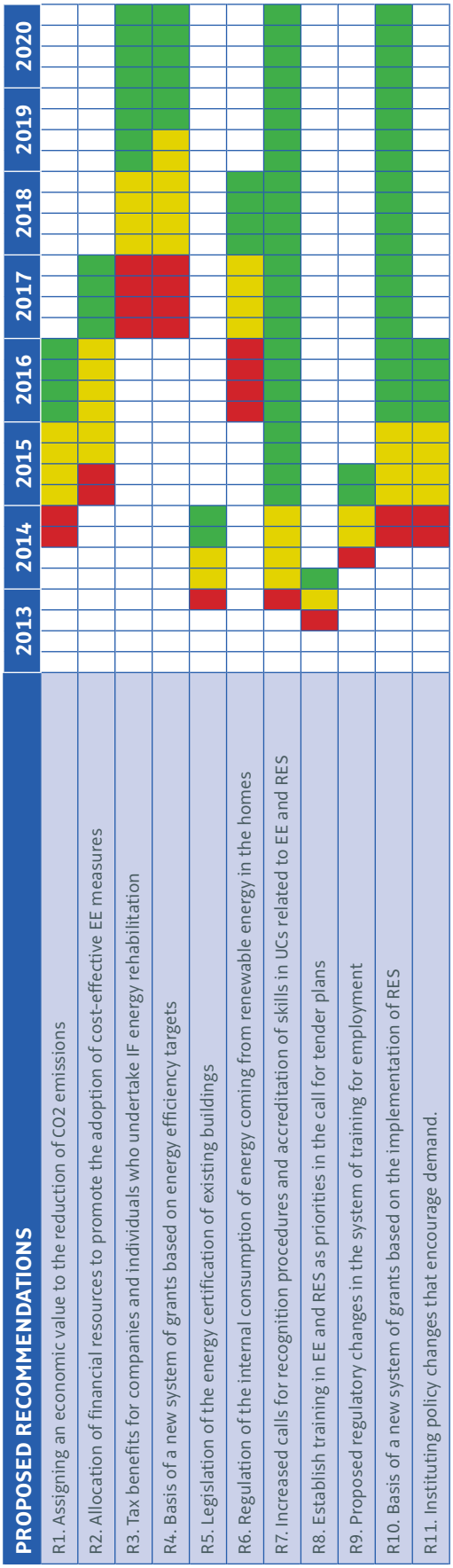


Figure 9: Plan of action for implementing the recommendations of the roadm

1.7 Support to the roadmap by the competent public authorities and stakeholders

NAME OF ORGANISATION	Person(s) to be involved (where known already)	Type of organisation
National Construction Federation (CNC)	Pedro C. Fernández Alén	Representative employers association of construction sector
Federation of Construction, Wood and Related Sectors of Comisiones Obreras, (FECOMA-CCOO)	Vicente Sánchez Jiménez	Representative trade union of construction sector
Federation of Metal, Constructions and Related Sectors of the Union General de Trabajadores (MCA-UGT)	Silvia Ramos	Representative trade union of construction sector
Ortiz Construcciones	Jose Luis Cano Muñoz	Construction company
Oficemen. Agrupación de fabricantes de cemento de España	Aniceto Zaragoza Ramírez	Association of materials manufacturers
Dirección del Área de formación para el empleo de la Consejería de Empleo, Turismo y cultura de la Comunidad de Madrid	Jose Manuel García del Cid Summers	Training and employment department
EFNECO	Carlos Aragó Riquelme	Construction engineering company
ATECYR	Rafael Vázquez Martí	Technical Association of air conditioning and refrigeration
Green Building Council España (GBCe)	Luis Álvarez-Ude Cotera	Initiative for a sustainable built environment
A3e. Asociación de empresas de eficiencia energética	Antonio López-Nava Muñoz	Business Association
AM. Estudio de arquitectura	Oscar Redondo Rivera	Architecture Studio
Fundación la casa que ahorra	Alberto Coloma Campal	Technical Association
Spanish Building Technology Platform (PTEC)	Ricardo Cortés Sánchez	Technology Platform
TRIPARTITE FOUNDATION FOR TRAINING FOR EMPLOYMENT (FTFE)	Alfonso Luengo Álvarez-Santullano	National public entity in charge of managing permanent training
Coria City Council	José Manuel García Ballestero	City Council
Energy technology institute (ITE)	Alfredo Quijano López	Energy Institution

CNC
Confederación Nacional de la Construcción

Madrid, 15 de abril de 2013

Sr. D. Javier González López
FUNDACIÓN LABORAL DE LA CONSTRUCCIÓN
Avda. Alberto Alcocer, 46B – 7ª pta.
28016 MADRID

Muy Sr. nuestro:

Como representante y Secretario General de la Confederación Nacional de la Construcción y a la vista de las actuaciones puestas en marcha por el proyecto **BUILD UP Skills Spain**, queremos trasladar nuestro apoyo y respaldo a su hoja nacional de ruta sobre cualificaciones y formación profesional.

En este sentido compartimos las acciones y recomendaciones propuestas, por lo que dentro de nuestras posibilidades facilitaremos su puesta en marcha de la manera más eficaz y eficiente posible. Además comunicaremos a todas nuestras organizaciones nuestro apoyo al proyecto **BUILD UP Skills Spain** así como a todos los terceros a los que la CNC pueda llegar.

Por último y en la medida de nuestras posibilidades participaremos en todas las actividades que se organicen para la puesta en marcha de la hoja de ruta de este proyecto haciendo una valoración de su conveniencia, como por ejemplo en la puesta en marcha de las redes de expertos o en iniciativas y grupos de trabajo especializados.

Atentamente,

CNC
Nº 198
16 ABR. 2013
SALIDA

Fdo.: Pedro C. Fernández Alén
Secretario General

C/ Diego de León, 50, 2.ª planta 28006 Madrid Tel.: (+34) 91 562 45 85 (+34) 91 561 97 15 Fax: (+34) 91 561 52 69 Internet: http://www.cnc.es

---

CCOO fecoma
federación estatal de construcción, madera y afines

Pso. Cristino Martos, 4 - 4ª pl
28015 Madrid
T/ 91 540 92 16 F/ 91 548 18 90
www.fecoma.es
fecoma@fecoma.ccoo.es

Madrid a 19 de abril del 2013

Don Vicente Sánchez Jiménez como representante de FECOMA-CC.OO. y en calidad de Secretario General, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

Madrid, 22 de abril de 2013

Don Luis Álvarez-Ude Cotera como representante de Green Building Council España (GBCe) y en calidad de director general, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

Luis Álvarez-Ude Cotera
Director General de GBCe
luis.alvarezude@gbce.es

GBCe
green building council
C/ Castellana, 114
Escalera 4-4, puerta 7
28046 Madrid
T. 914 119 855
info@gbcespana.com
www.gbce.es

---

la casa que ahorra
Calle del Tambre 21
28002 Madrid

Madrid, 15 de abril de 2013

Don *Alberto Coloma Campal*, como representante de la Fundación La Casa que Ahorra y en calidad de Gerente, a través de esta comunicación, expresa nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

Alberto Coloma Campal
Gerente
Fundación La Casa que Ahorra

FUNDACIÓN la casa que ahorra

EMPRESAS
18 ABR 2013
ENTRADA

Dirección General de Formación
CONSEJERÍA DE EMPLEO, TURISMO Y CULTURA
Comunidad de Madrid

Madrid, 22 de Abril de 2013

Don Ignacio Merino de Mesa como representante de la Dirección de Área de Formación para el Empleo y en calidad de Director, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

COMUNIDAD DE MADRID
DIRECCIÓN GENERAL DE FORMACIÓN
CONSEJERÍA DE EMPLEO, TURISMO Y CULTURA

Fdo. Ignacio Merino de Mesa

Director de Área de Formación para el Empleo

Atecyr
Asociación Técnica Española de Climatización y Refrigeración
Comunidad Valenciana

Valencia 16-04-2013

Como representante de **Atecyr Comunidad Valenciana** y en calidad de **Presidente**

A través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente

atecyr
COMUNIDAD VALENCIANA
Asociación Técnica Española de Climatización y Refrigeración

Rafael Vázquez Martí Presidente de Atecyr Agrupación Comunidad Valenciana

---

Madrid, 18 de Enero de 2013

Don **Oscar Redondo Rivera** como representante de AM Arquitectura y Urbanismo (Monteabaria SL) y en calidad de arquitecto director de proyectos, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

MONTEABARIA S.L.
B-85214...
C/ ORIENTE 11 GETAFE Madrid
DE 91 ...

Oscar Redondo Rivera

AM Arquitectura y Urbanismo
ESTUDIO ARQUITECTURA Y URBANISMO
C/ ORIENTE Nº11 LOCAL CP.:28901 GETAFE (MADRID)
estudio@am-arquitectos.net Telf.: 91.601.79.44

A3e | Asociación de Empresas de Eficiencia Energética

Madrid, 18 de abril de 2013

Don Antonio López-Nava Muñoz, como representante de A3e – Asociación de Empresas de Eficiencia Energética y en calidad de Gerente, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

ORTIZ

GRUPORTIZ

Madrid 15 de Abril del 2013

Don *José Luis Cano Muñoz* como representante de Ortiz, Construcciones y Proyectos, S.A. y en calidad de *Director Técnico*, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

Fdo. : D. José Luis Cano Muñoz

Avda. Emanche de Valleca, 44
28051 Madrid
Tell. 91.343.16.00
www.grupoortiz.com

Fundación Tripartita
PARA LA FORMACIÓN EN EL EMPLEO

DIRECTOR GERENTE

Madrid, 10 de abril de 2013

Don **Alfonso Luengo Álvarez-Santullano**, como representante de la Fundación para la Formación en el Empleo y en calidad de Director Gerente, a través de esta comunicación, expresa la intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Un cordial saludo,

Alfonso Luengo Álvarez-Santullano

C/Torrelaguna, 56 · 28027 Madrid · Tel 91 1195005 · Fax 91 1195009 · direccion.gerencia@fundaciontripartita.org

---

oficemen

Aniceto Zaragoza
Director General / General Manager

Fundación Laboral de la Construcción
Avda. Alberto Alcocer, 46B-7ª
28016 Madrid

A/A D. Enrique Corral Álvarez
Director General

Madrid, 17 de abril de 2013

Don Aniceto Zaragoza Ramírez como representante de la Agrupación de fabricantes de cemento de España (Oficemen) y en calidad de Director General, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

Agrupación de fabricantes de cemento de España
José Abascal 53, 1º. 28003 Madrid ▪ T +34 91 441 16 88 F. +34 91 442 38 17

DEPARTAMENTO INGENIERÍA

EFNECO
Eficiencia y Energía Ecológica

C/ El puig Nº 20
C.P.: 46960 PATERNA, VALÈNCIA
Tell: 647944241

Paterna a 24/04/2013

Yo, Carlos Aragó Riquelme con DNI: 48443398Q como representante de EFNECO y en calidad de director Técnico;

A través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain**.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente

Firma del representante y sello de la entidad

AYUNTAMIENTO DE CORIA
ALCALDÍA

Don **José Manuel GARCÍA BALLESTERO** como representante del Ayuntamiento de Coria y en calidad de Alcalde-Presidente, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto BUILD UP Skills Spain.

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente

Coria, 15 de abril de 2013
EL ALCALDE-PRESIDENTE,

Fdo.: José Manuel GARCÍA BALLESTERO

Plaza de San Pedro, 1; 10800, Coria - www.coria.org
alcaldia@coria.org - Tfno: 927 508 000 ext. 202 - Fax: 927 508 001

ITE
INSTITUTO TECNOLÓGICO DE LA ENERGÍA

Instituto Tecnológico de la Energía
Entrada
Salida 13/0417
Fecha 23/04/2013

Valencia, 24 de abril de 2013

Don Alfredo Quijano López como representante del ITE y en calidad de Director con poderes suficientes, a petición de la Fundación Laboral de la Construcción y de D. Julián González Gómez-Platero participante en el grupo de expertos de BUILD UP, a través de esta comunicación, expresamos nuestra intención de respaldar la hoja de ruta nacional sobre cualificaciones y formación profesional, desarrollada en el proyecto **BUILD UP Skills Spain.**

Compartimos las acciones y recomendaciones propuestas y en el marco de nuestra esfera de influencia facilitaremos su puesta en marcha. Además, informaremos puntualmente de este respaldo a nuestros grupos de interés y al público en general.

Así mismo, participaremos como ITE en las actividades organizadas para la puesta en marcha de la hoja de ruta, cuando esto sea posible y apropiado, por ejemplo en las redes de expertos, así como en iniciativas y grupos de trabajo especializados.

Atentamente,

Fdo.: D. Alfredo Quijano López
Director

Asociación inscrita en el Registro de la Generalitat Valenciana con el número 6600 de la Sección 1ª del Registro de Valencia CIF 0962516476

Avd. Juan de la Cierva, 24 • Parque Tecnológico • 46980 Paterna - Valencia • Tel. 96 136 66 70 • Fax 96 136 66 80
Edif. 6C Planta baja y 8A • Av. dels Tarongers, S/N • Universidad Politécnica de Valencia • 46022 Valencia (España)
ite@ite.es • www.ite.es

mano a mano
Por tus derechos

UGT MCA
Secretaría de Política de Formación, Empleo y Juventud
Afiliada a la TEM, FETCM, ICM y FITIM

LETTER OF SUPPORT

Call for proposals under the Intelligent Energy Europe (IEE) Programme – BUILD UP Skills, the new Building Workforce Training and Qualification Initiative

Mr./Mrs. **Silvia Ramos González** as a **Secretaria Politica de Formación, Empleo y Juventud** of **MCA-UGT**, located in Madrid in Avda. de América Nº25, hereby declare our intention to support the project **"Build a greener and a more sustainable future"** with the acronym **BUILD.GREEN,** Intelligent Energy Europe Programme call for proposals 2011 BUILD UP Skills, within the Competitiveness and Innovation Framework Programme (CIP).

The project will develop the following activities:

- Analysis of the national status quo (documentary, experimental, validation and prospective analysis)
- Build-up Spain on-line platform
- National qualification roadmap
- Endorsement process

And for the record, I sign it in Madrid, 01st June 2011

SIGNATURE

Silvia Ramos Gonzalez

2. Introduction

2.1. Building sector

2.1.1. Activity

It is a fact that the construction industry and, in particular, that of the building sector is going through an extremely complicated time, with a very marked decrease in both activity and in employment.

A datum that shows the drop in activity, are the **approvals of the site management** process by which the Architects' School gives conformity to the blueprints of the building and is, therefore, a leading indicator of the beginning of the productive process of construction, **which** have fallen dramatically since 2006.

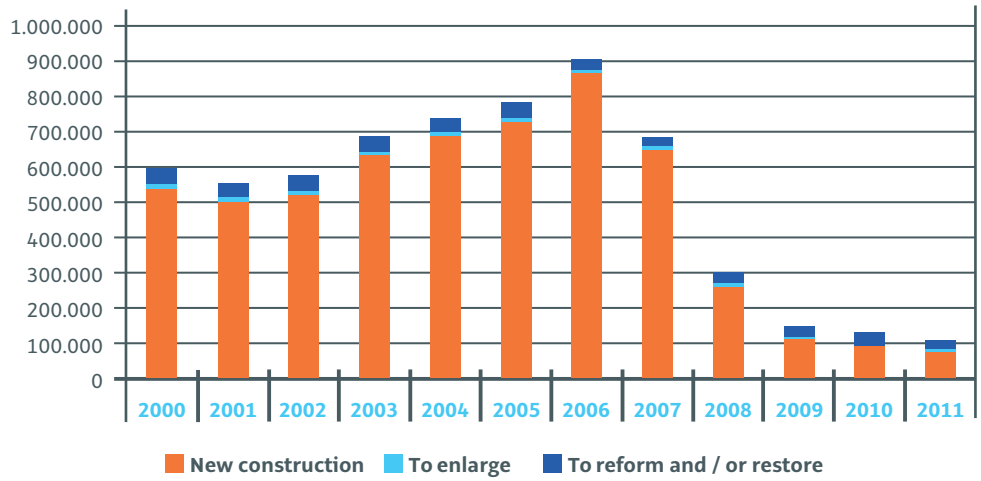


Figure 10: Approvals of the site management: Number of homes. Source: Ministry of Development.

2.1.2. Labour market

In the labour market in the construction sector, we observe that the number of assets in the sector has fallen steadily since 2007. This decrease together with the increase in the number of unemployed, leave the number of employed in the construction sector in 2011 at 1.393.000 people, 15.62% less than in 2010 and 110.95.000 people in 2012, 20% less than in 2011.

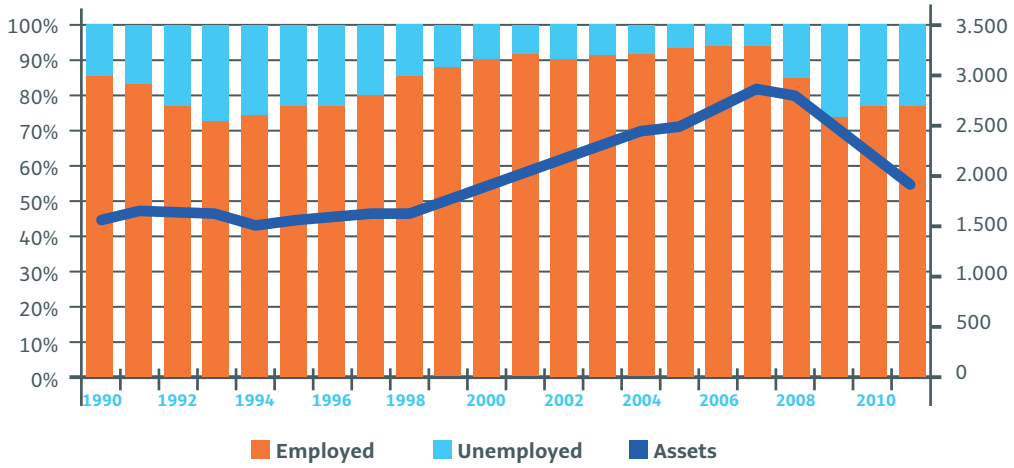


Figure 11. Active, employed and unemployed in the construction sector. (Thousands of people). Source: INE

2.1.3. Relationships with other sectors

Some sectors related to the construction sector, have been positively affected since the CTE came into force, and have introduced new equipment and professional specialties by incorporating the energy efficiency measures and, above all, the use of renewable energies in the rules. Despite the fact that the economic situation does not encourage investments, some sectors are investing in energy efficiency and renewable energies, especially, the industry, hospitality (hotels) and trade (food).

2.1.4. Economic contribution to GDP

The contribution of the construction sector on the national GDP over this series has gone from 9.31% in 2000 to 10.53% in 2011. The largest share was reached in 2006 reaching 12.60% of the Spanish GDP.

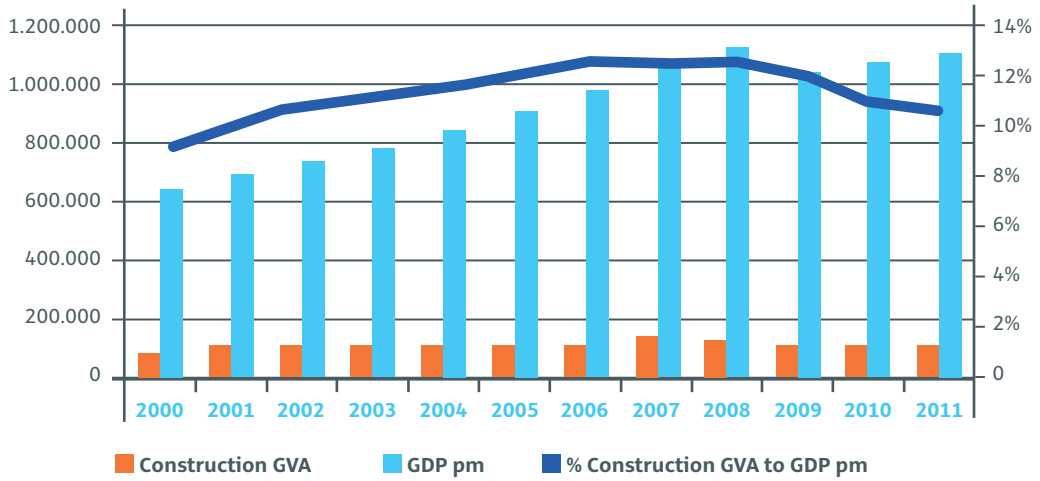


Figure 12. Economic contribution of the construction sector. Source: INE

2.1.5. Supply chain

The extraction sectors of building materials and their production have dropped significantly both in terms of activity and occupancy. Another variable particularly affected by the crisis has been the expenditure on R & D, which, for example, decreased from 2008 to 2009 from 8.27 million to 3.93 million.

Despite this, it is noteworthy that in the production of materials there has been a major qualitative leap: it has boosted R & D, for the development of new materials tailored to energy efficiency, but above all, the material supplier has incorporated renewable products into its product catalog. In this regard, experts consider that including energy labeling in products or materials used in construction would be a competitive advantage (windows, boilers, heaters).

2.1.6. Market trends and forecasts

From the market forecasts carried out by EUROCONSTRUCT for Spain, the downward trend is expected to continue in 2012, marked by a severe contraction in production (-30.8%), with a similar contraction in 2013 (-23%) and a somewhat less pronounced one in 2014 (-6%). Thus, in Spain, the group forecasts suggest that the situation in the construction sector is "critical" and, furthermore, there are still no signs of turnaround.

From a more general overview point, experts believe that the sector will only be able to achieve the 2020 targets if it is accompanied by sector specialization plans and incentives from the Administration, both in the area of renewables as the subject of energy efficiency

2.1.7. Major changes that affect it

The incidence of certain factors commonly described as **demand factors** are influencing negatively, especially in the building sector:

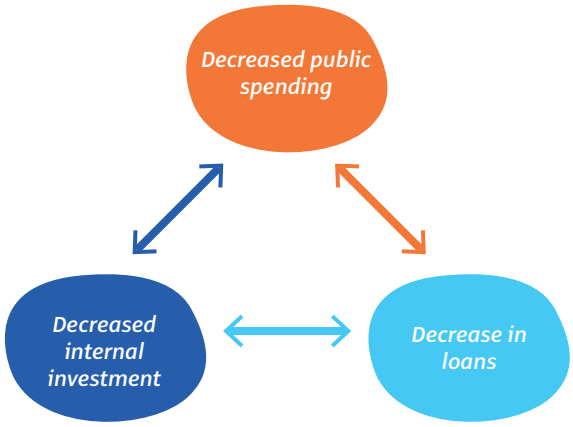


Figure 13. Demand factors having a negative effect on the construction sector

Public spending in civil engineering and construction followed an upward trend until 2006, except for the volume contraction tendered for civil engineering in 2003. Since 2006, the variable trend has been negative, except for the temporary rise in the budget intended for civil engineering that took place in 2008.

Meanwhile, **domestic investment** in real estate peaked in 2007 and has been declining since until setting the index (base 2000) at 65.15 points in the fourth quarter of 2011. The average annual decline in the four quarters of 2011 was -22.43%.

Finally, in the area of production activities, the largest **credit** crunch has taken place, yet another year, in the funding of activities of the construction sector. The decreases in granting credits to sector agents were settled at the end of 2011 in annual rates of -13.98%.

It is noteworthy that experts believe that the general public funding system works, to the extent that great results have been achieved through public funding of EE and the use of RES. The elimination of many poor teams has been promoted with a few not too substantial public aids. The specific application of public expenditure to build with EE and RES criteria is especially important to the extent that the private financial support for investing in the area is practically nonexistent. Among other measures, public incentives for research and development are proposed, as well as a larger support through tax deductions.

2.1.8. Immigration and emigration

There are two important factors in the impact of migrations in the construction and housing market. First, the demographic factor plays an important role in determining the demand for housing and therefore the migratory movements directly affect the housing needs and demand of the population. Traditionally, the activity that in percentage welcomes more foreign workers is the construction industry.

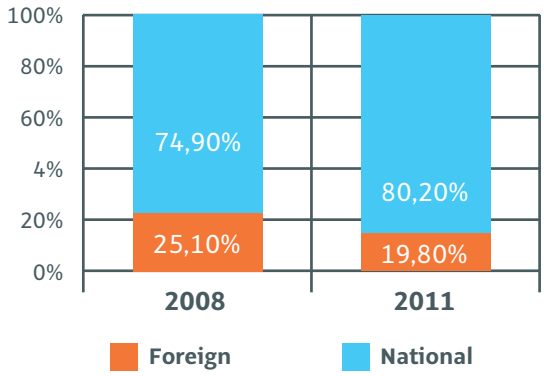


Figure 14. Weight of the domestic and foreign workers in the construction sector. Source: INE

Regarding the migration, it is worth noting that many highly skilled professionals such as engineers or architects are migrating abroad in search of opportunities, mainly to countries where construction is emerging.

2.1.9. Shadow Economy

In the study **The shadow economy in Europe** (Friedrich Schneider, 2011) published by A. T. Kearney, he estimates the shadow economy in Europe at 3.3 trillion Euros in 2011, i.e., 5% higher than the estimation carried out for 2007. The estimated percentage for 2012 representing the shadow economy in Spain is 0.8 percentage points above the average calculated for the Europe of 27, with a magnitude of 19.2% of GDP.

The level of shadow economy varies depending on the nature of the economic sector in which these activities take place. In Spain, for example, in 2009[1] , 29.3% of the GDP generated by the construction sector activities would correspond to outside regulation.

It should be noted that experts confirm that there is a shadow economy in the sector, and say that it is mainly recorded in the rehabilitation subsector, for the facilities it gives to non-activity statement. The new rules in EE and RES can be an opportunity to mitigate the problem, provided grants and subsidies be conditional upon a declaration of economic activity and employment.

2.1.10. Professional profiles involved

Although there have been new professional profiles related to the use of RES, in EE, experts do not believe new professional profiles to arise, but it will be necessary to recycle the existing ones. It is noted as necessary that all the workers in a site, whether it is building or rehabilitation, have a comprehensive knowledge, so that they understand the importance of the demands in the changes of the rules and the consequences that will originate in the construction sector.

[1] Latest data available on the percentage of shadow economy per economic sector.

Although having skilled professionals for companies is always positive, at present, and until there is a further development of the EE, it is not a competitive advantage for companies; it will be if the EE and the use of RES in buildings is boosted. The companies will put it in their curriculum when it is a competitive element because of consumers' demand.

The analysis carried out shows that the occupations that generally require further updating on this matter and they will need specific training activities are:

- Operator for sealing joints
- Aluminum and PVC metalwork assembler
- Thermal Solar Installations fitter
- Mason
- Installer for heat generation systems by harnessing geothermal energy.
- Installer for heat generation systems by biomass combustion.
- Plumber
- Photovoltaic installations fitter
- Authorized installer for ACS and air conditioning systems
- Roofing and rainwater networks installer

2.2. National policies and existing provisions on energy and Professional Training

2.2.1. National policies on energy

The Spanish national strategy responds to date to the principle of sustainability understood in its triple dimension of economic efficiency, social equity and environmental quality. At present, it prioritizes actions aimed at the rehabilitation of buildings, improving urban areas and territorial cohesion, since the existing buildings are the largest contributors to energy expenditure and it is expected that, at least in the next ten years, the construction of new buildings be much lower than in the previous economic cycle.

Since the construction sector in Spain has focused traditionally on the construction of new buildings, especially in relation to the residential area, the strategies intended for the rehabilitation of buildings have a regulatory development, so far less than those on a new construction. These strategies are:

- Improving the energy performance of the building stock.
- Establishment of minimum energetic provisions in the new buildings and in those that suffer reforms of a certain entity and its evidence through energy efficiency labels.
- Improving the existing urban fabric in order to improve the environmental quality and reduce energy consumption and CO2 emissions.

In this line, the action plan for **Energy Efficiency and Saving 2011-2020**, adopted on July 29th 2011 in compliance with the directive 2006/32/EC of energy efficiency, involves an investment plan in the industry for the improvement of the energy efficiency of the building surroundings, the thermal installations and lighting of the existing structural park development, as well as the construction and comprehensive rehabilitation of 8.2 million m^2 per year with high energy rating, creating an exclusive market for the construction of buildings with almost zero energy consumption.

2.2.2. Legal regulations on energy efficiency and renewable energies applied to building.

Technical Building Code

The Technical Building Code (CTE) is the regulatory framework that establishes the requirements to be met by buildings in relation to the basic requirements of safety and habitability established by Law 38/1999 of November 5th, of the Building Plan (LOE). It has a series of Basic Quality Requirements to be met by the buildings:

- **HE Basic Requirement 1:** Limiting energy demand
- **HE Basic Requirement 2:** Thermal installations output
- **HE Basic Requirement 3:** Energy efficiency of lighting installations
- **HE Basic Requirement 4:** Minimum solar contribution to DHW
- **HE Basic Requirement 5:** Minimum photovoltaic contribution of electrical energy

Regulation of Thermal Installations in Buildings (RITE)

The Regulation of Thermal Installations in Buildings (RITE), sets out the conditions to be complied with by the facilities designed to meet the demand for thermal comfort and hygiene through heating, air-conditioning and sanitary hot water installations; to achieve a rational use of energy.

Energy Efficiency Certification for new buildings

The certification of energy efficiency in buildings is a requirement under the Directive 2002/91/EC, transposed into Spanish law by Royal Decree 47/2007, which approves the Basic Procedure for the certification of energy efficiency of new construction buildings.

Certification of energy efficiency in existing buildings

On February 2nd 2012 the Royal Decree Draft has been subjected to a hearing procedure and subsequent approval where the basic procedure for the Energy Efficiency Certification of existing buildings is approved.

As with the new buildings the ultimate goal of this decree is that every existing building has an Energy Efficiency Certificate that provides objective information to buyers and users in general.

Energy Efficiency and Renewable Energy Bill

This Bill seeks to provide certainty to private investors, encourage the continued development of technologies intended for the utilization of renewable energies and create a market for companies involved in energy efficiency.

It seeks to meet the goal of reaching 20% of energy consumption from renewable sources by 2020 boosting its implementation, improving energy efficiency and increasing the use of **biofuels**.

2.2.3. National policies on professional training

National policy regarding jobs and professional green competences and sustainability

According to UNEP[2] , green jobs are those that reduce the environmental impact of enterprises and economic sectors to sustainable levels. They are jobs that help reduce the consumption of energy, raw materials and water through efficiency strategies to decarbonize the economy and reduce greenhouse gas emissions, to reduce or completely avoid all forms of waste and pollution, and protect and restore the ecosystems and biodiversity.

In this regard, the Government of Spain has already taken the initiative to deepen the transformation of the production model by Law 2/2011, of March 4th, on Sustainable Economy (LES) and the Strategy for a Sustainable Economy, which forms a strategic framework of the broader production system in the medium term, addressing many of the changes that are needed to encourage and accelerate the development of a more competitive, more productive and more innovative economy. This strategic framework, having the participation of the whole society, includes structural changes, which according to some reports, may generate up to 2.775.000 green jobs by 2020.

On this basis, the LES lays the foundation for a new energy model based on the security of supply, the economic efficiency and the environmental friendliness. Thus, it is incorporated into the legal order on emissions, saving, energy efficiency and renewable energy goals reflecting the commitments of the European Union for 2020: obtain 20% savings in energy, reduce by 20% CO_2 emissions and that the energy coming from renewable sources be 20%.

The LES gives vital importance to Professional Training and Education, Chapter VII is exclusively devoted to this subject, noting major reforms in the professional training system. The aspects of an organic nature in this reform are conducted through the **Organic Law** 4/2011, of March 11th, complementary to the LES and the **Royal Decree** 1147/2011. The aim is to facilitate the adaptation of the training supply to the demands of the productive system, expanding the professional training supply, advance in the integration of professional training in the whole education system and strengthen cooperation of the educational administrations.

In particular, the initiatives that are approved by the complementary Organic Law help speed the updating of the National Catalogue of Professional Qualifications and of the modules of the profesional certificates of training and professional certificates and introduce the possibility of creating specialized courses and distance learning platform for the entire State. Moreover, the policy changes needed to promote mobility between professional training and high school, as well as between professional training and university are adopted.

Finally, through this Law, an integrated professional training supply as well as the involvement of social partners and a greater collaboration with private companies is promoted.

On the other hand, note that the national program REFORMS 2012 of the kingdom of Spain, which has, among other objectives, the labour market flexibility, helping to increase the competitiveness, growth and employment through a more effective and efficient professional training, raising amongst other dual professional training measures, promoting guidance and job placement, etc.., updating PT titles and promoting access to training through new technologies.

2.2.4. Legal provisions on professional training

Initial professional training subsystem

In Title II of the **Organic Law 5/2002**, of June 19th on the Qualifications and the Professional Training (BOE of June 20th 2002), various aspects of Professional Training are articulated, but perhaps the most important is Article 10, which explicitly states that both the educational degrees and the certificates of professionalism, will constitute the professional training offers relating to the National Catalogue of Professional Qualifications.

[2] United Nations Program for the Environment

On this basis the Regulated Professional Training is adequately covered by the **Organic Law 2/2006**, of May 3rd, on Education (BOE of May 4th 2006) in Chapter V, Articles 39 - 44, which describe the general principles, objectives, conditions of access, content and organization of the supply, assessment and the certifications and validations.

Subsequently, the **Royal Decree 1538/2006**, of December 15th, begins the general organization of the professional training in the educational system, starting a flexibilization process of the initial PT proposed in the LOE (2006).

Moreover, in 2007 the **Royal Decree 395/2007** appears, of particular importance as it regulates the now known as Professional Training for Employment (BOE April 11th). The changes appearing here are remarkable, four training initiatives being established: demand training, supply training, alternation training with employment and support actions related to training.

A year later, in 2008, the **Royal Decree 34/2008** of January 18th (BOE January 31st) which regulates the certificates of professionalism was promulgated, and in 2009, Royal Decree 1224/2009 (BOE August 25th) of July 17th, which states the recognition process of the professional competences acquired through work experience.

Finally, the **Organic Law 4/2011**, of March 11th (BOE March 12th) complementary of the Law 2/2011 on Sustainable Economy (LES), amends Organic Law 5/2002 and 2/2006, in order to improve the adaptability of professional training to the labour market needs. For its development, the government published **Royal Decree 1147/2011** of July 29th, establishing the professional training of the educational system's general organization, far-reaching reform that introduces important innovations among which stand out:

- Integration in managing the PT, the professional modules of the PCPI
- Specialized courses of the training cycles
- Expand the possibilities of access to intermediate and high courses
- Flexibilization of the training offer to ensure a better adaptation to the demands of the socio-economic environment

Unfortunately, due to the economic crisis, the implementation of this Royal Decree is severely limited by the appearance of Royal Decree Law 14/2012, of April 20th, on urgent measures to rationalize public spending in education.

Professional training for employment subsystem

The Professional Training for Employment Subsystem is the result of the unification of the legislation on occupational and continuing education, the Qualifications and Professional Training Law, aligned with the Lisbon Strategy 2010 of the EU.

In the area of the European Union lifelong learning is considered as "an employment strategy within a knowledge-based economy."

This professional training subsystem is stated in the Royal Decree 395/2007 which defines it as "the set of instruments and actions that aim to promote and extend, between the companies and the employed and unemployed workers, a training that meets their needs and contributes to the development of a knowledge-based economy".

Their initiatives are:

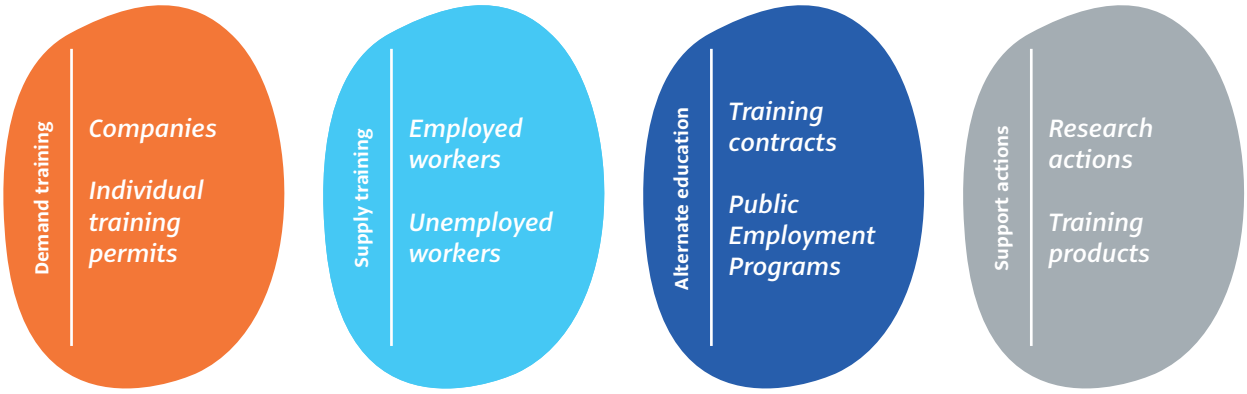


Figure 15. Training for employment initiatives

The National Professional Qualifications System and Professional Training (SNCFP)

The SNCFP is a set of tools and actions needed to promote and develop the integration of the professional training offers through the **National Catalogue of Professional Qualifications** (CNCP). It also seeks to promote and develop the evaluation and accreditation of the relevant professional competences, so as to encourage the professional and social development of the people and meet the needs of the productive system.

The SNCFP is made up of:

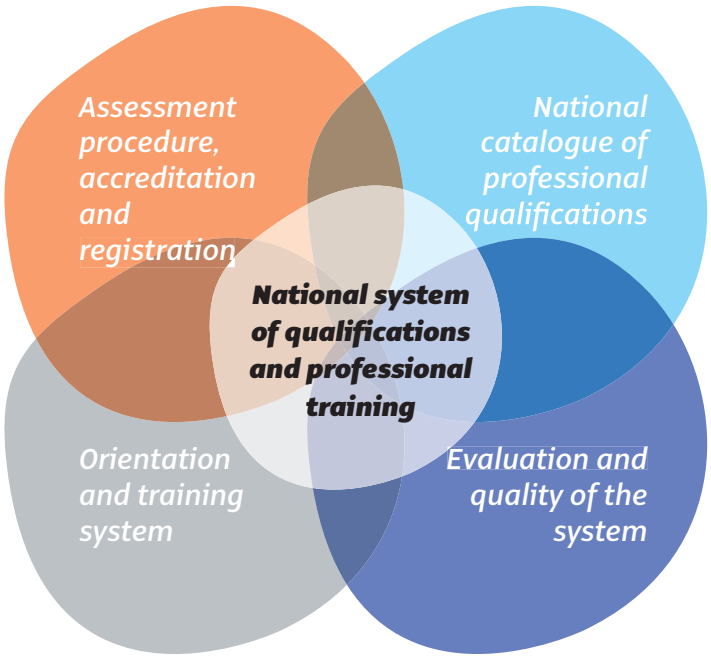


Figure 16. Tools and actions of the SNCFP

Recognition procedure, assessment, accreditation and registration of Professional Qualifications

It is a set of actions aimed at recognizing, assessing and accrediting professional competences acquired through work experience or non-formal training.

This evaluation and accreditation of professional competences is developed following criteria in order to ensure the reliability, objectivity and technical rigor of the assessment. The National Catalogue of Professional Qualifications serves as an objective reference in this procedure.

The National Catalogue of Professional Qualifications (CNCP)

The CNCP is the instrument of the SNCFP that sorts the susceptible professional qualifications of recognition and accreditation, identified in the production system in terms of appropriate competences for professional practice.

It comprises the most significant professional qualifications of the Spanish productive system, organized in professional families and levels. It constitutes the basis for developing the training offer of the titles and the certificates of professionalism.

The CNCP includes the professional training content associated with each qualification, according to an articulated structure of training modules.

The National Institute of Qualifications (INCUAL) is responsible for defining, developing and updating the CNCP and the corresponding Modular Catalogue of Professional Training.

A. The Modular Catalogue of Professional Training (CMFP)

The CMFP is the set of training modules associated to the different units of competency of professional qualifications. It provides a common reference for the integration of professional training offers to allow capitalization and promote learning throughout life.

B. Professional Families and Levels of Qualification

The SNCFP considers 26 professional families and 5 different levels of qualification.

C. Professional qualifications of the CNCP

There are currently 664 approved qualifications in the Council of Ministers and published in the Official State Gazette of the Kingdom of Spain.

Guidance and training system

Collaboration between training and technological experts of different professional families ensures a coordinated view of the world situation and employment training. Therefore, the guidance and information is characterized by the following aspects:

- Coordination between the training and employment areas.
- Coordination among professionals of the local, regional, national and European administrations.
- Transparency of the professional competences.
- Transparency of the workplace.
- Interaction through forums of the different professional families.
- Networking with the observatories of the Autonomous Communities.
- Structured and contrasted information.

System quality and evaluation

Law 5/2002, dated June 19th on the Qualifications and the Professional Training, dedicates its Title IV to quality and system evaluation. The assessment of SNCFP will have the basic purpose of ensuring the effectiveness of their actions and their relevance to the needs of the labour market.

Its establishment and the coordination of the evaluation process correspond to the Government, after consulting the General Professional Training Council, without prejudice to the competences attributed to the Autonomous Communities.

The European Union is developing a number of initiatives in professional training quality. Among them we note:

- The Common Framework of Quality Assurance for Professional Training in Europe (Common Quality Assurance Framework CQAF- for VET in Europe)
- European Network for Quality Assurance in Professional Training (European Network on Quality Assurance in VET)

The Spanish Qualifications Framework (MECU) and the European Qualifications Framework (EQF)

European Qualification Framework (EQF)

The European Qualifications Framework for Lifelong Learning (EQF) is a common European reference framework that allows European countries to compare their qualifications. Starting from a common reference framework, they will improve the transparency, comparability and portability of the citizens' qualifications issued in accordance with the practices of the different Member States.

- It supports a better match between the labour market needs and the education and training.
- It facilitates the validation of the learning acquired through channels other than the official teachings.
- It facilitates the transfer and use of qualifications, education and training systems across different countries

The EQF allows us to relate the qualifications of different countries around a common reference at European level. In practice, it will work as a qualifications translation device. This will help the mobility of the students and the workers.

The EQF uses 8 reference levels based on learning results, in what a person really knows and is able to do (knowledge, skills and competences), regardless of how they acquired those skills.

The Spanish Qualifications Framework (MECU)

The instrument that will allow comparing the qualifications recognized in Spain with those of the rest of Europe through the European Qualifications Framework (EQF) is the Spanish Qualifications Framework (MECU) for lifelong learning.

With the MECU, the students, the workers, the employers, the entities that provide training and, in general, all the citizens will be able to better understand the national qualifications system.

Therefore, the MECU's basically an **organizational structure of the learning levels**, from the most basic learning to the most complex.

Other training and accreditation policies of the building sector themselves. The Professional Construction Card (TPC)

The Professional Construction Card (TPC) is the document that proves, among other data, the specific training received by the employee in terms of occupational risk prevention, as well as the professional category and the periods of occupancy in different companies in which he will exert his activity.

The Construction Labour Foundation is the entity responsible for implementing, developing and disseminating the TPC, as a result of the provisions of Law 32/2006, which regulates subcontracting in the construction sector and the provisions of the V General Agreement of the Construction Sector (2012-2016).

Figure 17. Tools and actions of the SNCFP

2.3. Quantitative data

2.3.1. Current number of workers in the building sector[3]

The decrease in the working population has been generalized in all the productive sectors, but the decline has been most intense in the construction sector, where the employment has dropped 43.9% between 2008 and 2011, going from 2.549.500 to 1.430.200 people. The year 2012 has also been especially harmful to the occupation of the sector, as the latest data available, III trimester of 2012, registers an occupation of 1.136.800 employees.

Activity branch	2012 TIII
F Construction	1.136.800
41 Building construction	431.400
42 Civil engineering	113.100
43 Specialised construction activities	592.000

Figure 18. Distribution of employees by activity branch in the construction sector. Source: INE

The occupational structure in the construction sector compared to the whole of the Spanish economy is characterized by a greater importance of skilled workers[4]. Skilled workers account for 60% of those employed in construction, compared to 12.4% in the total employed.

On the other hand, the sector represents a very small proportion of higher-level occupations such as technicians and managers, 8.6% among workers in construction, and 21% among the total employed. It is also worth noting, the small proportion of administrative employees. Therefore it can be concluded that the occupational structure of the construction sector is characterized by having few employees in higher-level occupations and a very high proportion of skilled workers.

[3] There are no disaggregated data of employees in the construction sector by trades.

[4] He, who can perform his work independently and responsibly, regardless of whether or not this qualification is credited officially, would be considered a skilled worker.

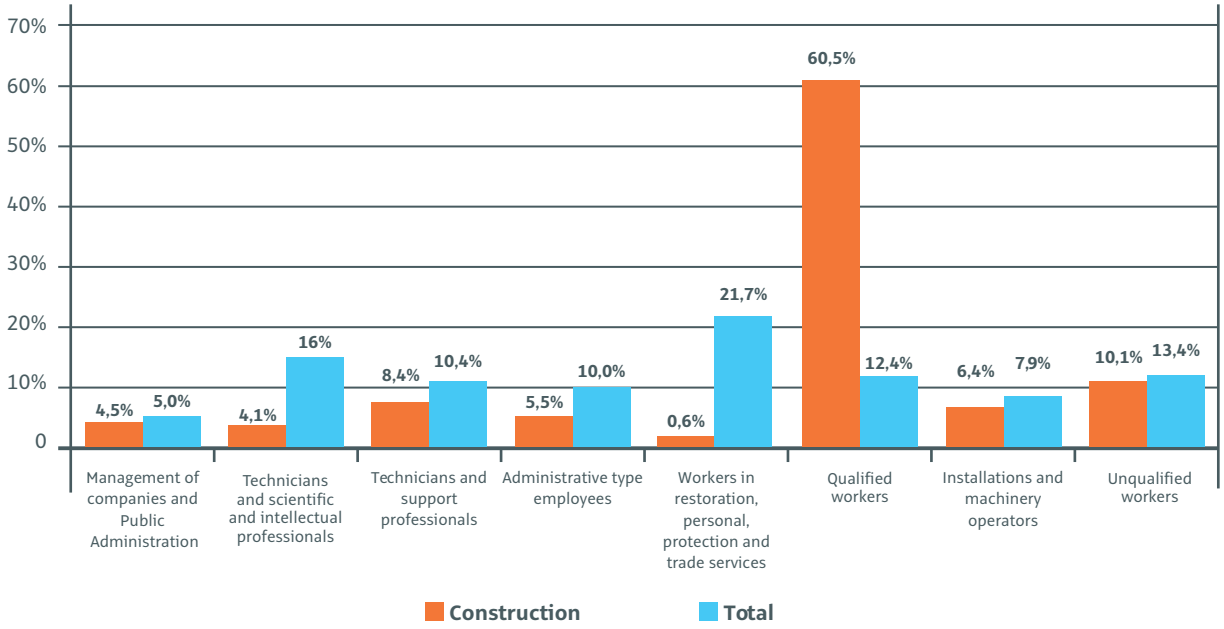


Figure 19. Structure of employment in the construction sector and total employment in Spain 2011. Source: INE: Exploiting EPA IIT Microdata 2011

The training structure is closely related to the occupational structure, as it is composed mainly by occupations of skilled workers, the training level is less than the whole of the employment in Spain.

56.5 % of those employed in the construction sector have a first stage educational level of Secondary Education or less, a figure that contrasts with a collective significantly smaller (38.5 %) between those employed in all the economic sectors. More specifically, 38.9 % of the workers in the sector have reached the first stage of the secondary education level and training and corresponding job placement, 14.6 % has a maximum level of studies, primary education, whereas 3% of those employed do not have any completed training. On the other hand, in the construction industry the level of higher education contains 9.7% of the workers, while in the set of economic sectors it reaches 26.9%.

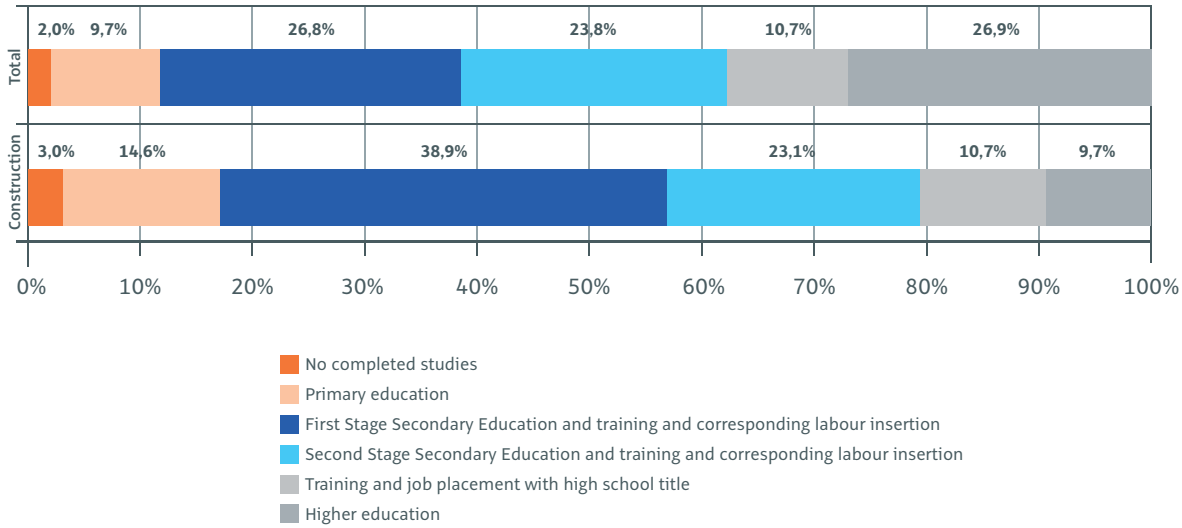


Figure 20. Structure of the training level of workers in the construction sector and total employment in Spain. 2011. Source: INE: Exploiting EPA IIT Microdata 2011

2.3.2. Current energy use in the country and in the building sector

This section has been drawn almost entirely from the study carried out by the Institute for Diversification and Energy Saving (IDAE) called **SECH-SPAHOUSEC Project.** Analysis of the energy consumption in the residential sector in Spain.

The energy consumption in the residential sector

The **residential sector** is a key sector in the current energy context, due to the importance of its energy needs, which in Spain, and in terms of final energy, mean 17% of total final consumption and 25% of the electricity demand.

According to the data in the Analysis report of the energy consumption in the residential sector in Spain developed in the SECH-SPAHOUSEC project, **the average consumption of a Spanish household is 10.521 kWh a year (0,038 TJ)**, being predominant, in terms of final energy, the consumption of fuels: 1.8 times higher than the electricity consumption. 62% of the electricity consumption is due to the household appliances, and to a lesser extent to the lighting, cooking and heating and hot water services.

	Final Consumption (TJ[5])		
	Electric	Fuels	**Total**
Heating	15.907	272.667	288.574
DHW	16.129	100.114	116.243
Kitchen	20.063	25.588	45.651
Refrigeration	5.042	107	5.148
Lighting	25.366		25.366
Appliances	133.470		133.470
Total Consumption	**215.978**	**398.475**	**614.453**

Figure 21. Breakdown according to Thermal and Electrical Consumption. Source: IDAE

Taking into account all the services and equipment available in the Spanish households, the heating service has the greatest demand for energy, with about half of all the consumption in the residential sector (47%).

Distribution of the houses by climatic zones and consumption associated to each zone

Regarding the distribution of the houses in the different climatic zones, there is a greater concentration of population in the areas of Mediterranean climate and the population is less dense in the Continental climate, except for Madrid and some isolated areas of the northeast of the peninsula, and somewhat denser in the region of the Atlantic climate.

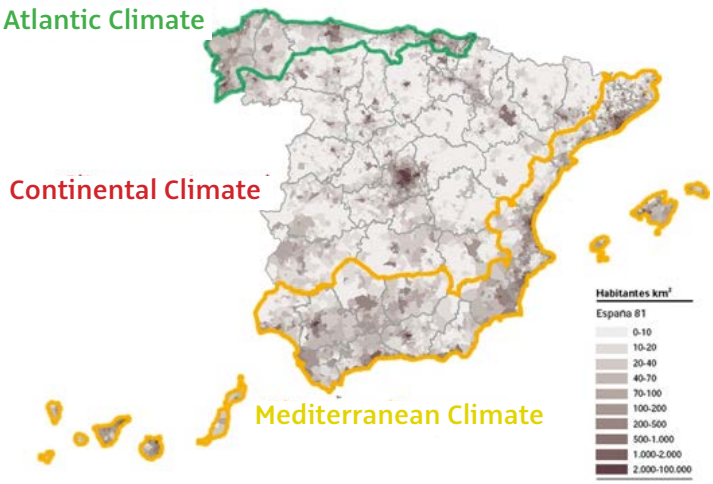


Figure 22. Distribution of the population in Spain in 2001 and types of weather. (Source: Authors from data of the National Statistical Institute and the IDAE)

[5] Terajoules

In total values, according to the data of the SECH-SPAHOUSEC Project, **nearly half of the houses are located in areas with a Mediterranean climate**, although it is also in this area where there is a higher vacancy rate according to the Housing and Population Census 2001 carried out by the National Statistics Institute.

Next in number are the homes located in the continental area, although it is in this area where there is a higher percentage of secondary homes or of discontinued use (weekends and holidays), according to the Housing and Population Census 2001 carried out by the National Statistics Institute.

Note that the **total consumption of the houses located in the Mediterranean area is approximately equal to the total consumption of those located in the continental climate zone**. This is because, although the weather is much more temperate in the Mediterranean, the dominant energy source in block homes in this area is electricity, as a result, a large part of the energy demands of HVAC are carried out with electrical equipment.

Climate Zone	Average consumption in houses	Total number of houses	Approximate total consumption in houses
North Atlantic	0,799 tep	2.253.421	1.800.483,379 tep
Continental	1,087 tep	5.782.834	6.285.940,558 tep
Mediterranean	0,719 tep	9.163.375	6.588.466,625 tep

Figure 23. Total consumption in houses according to the climate zone. Source: IDAE

Moreover, in the graph below you can see how the total consumption of the homes located on the North Atlantic is significantly lower than of those that are located in the other two climatic regions and it represents approximately 12% of the energy consumed by the Spanish housing stock.

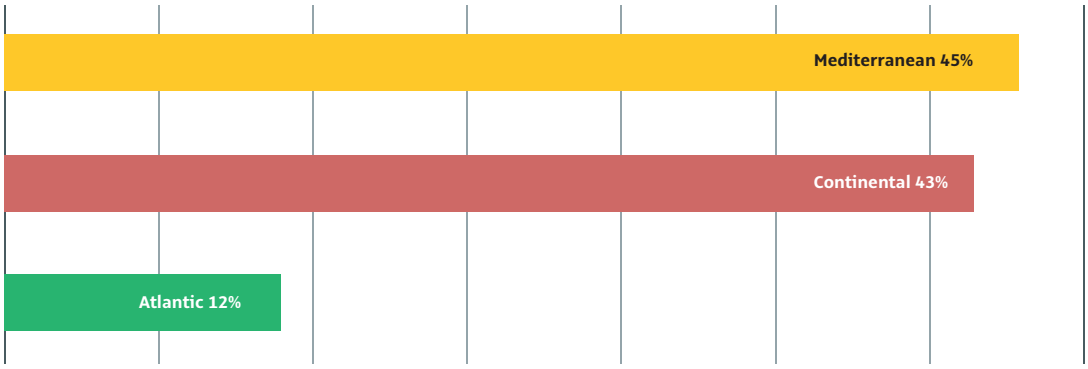


Figure 24. Total consumption percentage in the existing homes in each climate zone. Source: Authors from the data in the Housing and Population Census 2001, carried out by the National Statistical Institute and the SECH-SPAHOUSEC Project developed by the IDAE)

Most of the energy consumption in the Spanish households comes from heating and hot water production.

Finally it should be noted that approximately 80% of the Spanish homes are block homes. This implies, first, that the energy consumption per m² for its climate is moderate and much lower than the single family houses in the same climate zone, up to 6 times lower in the Mediterranean area. And second, that the reform of its common elements (facilities, thermal enclosure, etc.) Requires a consensus among the owners.

[5] Terajulios

The type of energy used in homes

The consumption in the residential sector is based on two-thirds fuel, mostly petroleum products, natural gas and renewable energies.

On the other hand, it seems that renewable energies are becoming increasingly more important, contributing to the approximate thermal demand of those of the petroleum products.

Finally it should be noted that not all renewable energies are used directly by the buildings. Thus, we have to exclude wind power, photovoltaic power, hydro power or biogases that as renewable sources are used to generate electricity, although in very rare cases can be used for domestic purposes. The most widely used renewable energies for buildings are synthesized primarily into three: biomass, geothermal and solar thermal.

The most used renewable energy is biomass consistent with the direct burning of firewood and branches. The wood represents 98.5% of the renewable energy used in heating and 70% of that used for hot water production.

The energy consumption in the non residential sector

The existing statistical data in Spain in relation to the residential sector are wide and, conversely, the building data relating to non-residential sector are quite scarce.

In 2010 the residential buildings consumed 17.5% of the final energy consumption nationwide and the service buildings consumed only 8.6% of the total.

Also, while in the residential buildings, the thermal consumption regarding hot water and, especially, heating, the electricity consumption is more than double, heating in the buildings of the services sector only represents 31.1% of final energy consumption followed by the air conditioning (26.2%), lighting (22%), equipment (17.3%) and hot water (3.3%).

However, the potential energy savings of the residential buildings (27%) is similar to those for the services sector (30%) according to the European Commission. (Source: European Commission. Estimated potential energy savings by sector. EU-25 ***baseline Scenario and Wuppertal Institute***. 2005)

Also, there were no data regarding the renewable energies installed in buildings. However, there are data on the installed power for electricity generation.

Renewable energy	Nationwide total
Hydraulic	2.036
Wind	20.881
Solar PV	4.099
Solar thermoelectric	949
Renewable Thermal	1.142

Figure 25. Power installed on December 31st 2011 relating to renewable energies. Source: Spanish Electrical Network

If the energy intensity in the Spanish Domestic sector is compared with that of other European Union countries, it is observed that the energy intensity in Spain (0.92 toe/home) is about 40% below the European average (1.53 toe/home), taking as a reference 2008 data. (Source: Ministry of Industry, Trade and Tourism, IDAE Savings Action Plan and Energy Efficiency 2011-2020). This is due, in part, to the existence of a milder climate in most of the Spanish territory.

[5] Terajulios

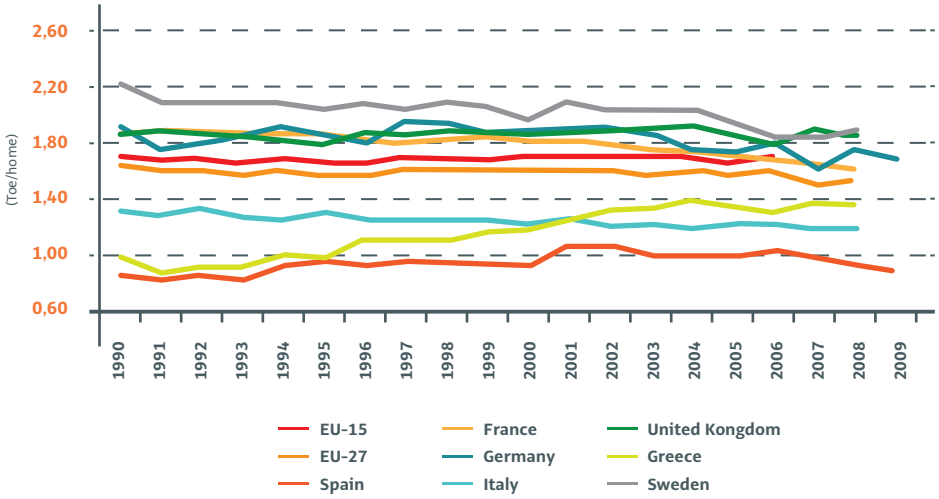


Figure 26. Ministry of Industry, Trade and Tourism, IDAE Savings Action Plan and Energy Efficiency 2011-2020

The electrical intensity in the residential sector is still in an upward trend, though below the European average, to achieve convergence with the European average at the beginning of the past decade. Since then, both indicators, the national and the European have evolved in parallel, registering both a certain stabilization with the downward trend which, in the national case, manifests itself clearly from the year 2005, moving below the European average at a distance of 20%, which continues reinforced to this day by the effect of the crisis affecting Spain, which leads to a lower economic activity.

An electric intensity rating of the services sector leads to different conclusions from those reached for the residential sector, showing a reversal of the situation noted above. In this case, the national indicator evolves above the European average and of the neighboring countries. Thus, according to the data available from 2008, the national indicator (148.5 kWh/€00) is above the European average (112.39 kWh/€00) by 32%. (Source: Ministry of Industry, Trade and Tourism, IDAE Savings Action Plan and Energy Efficiency 2011-2020).

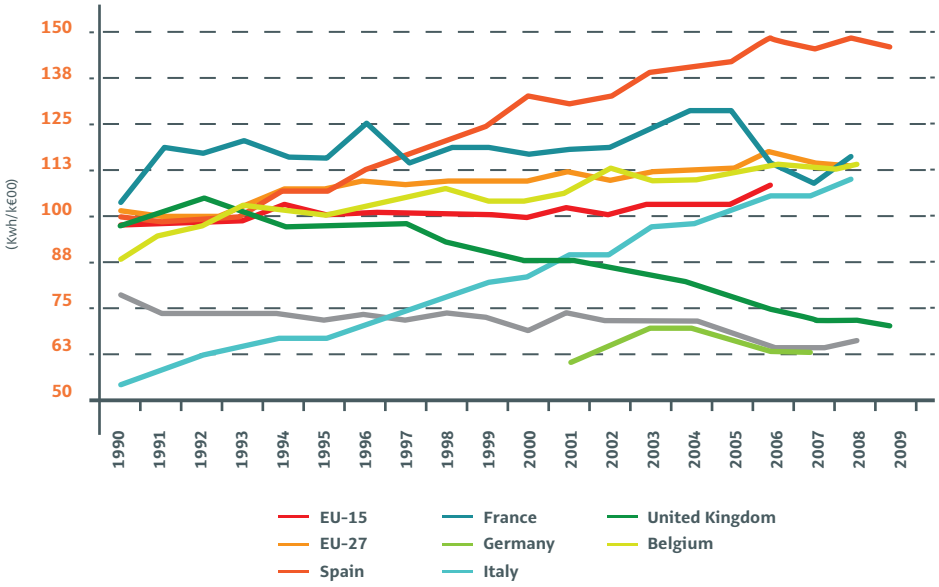


Figure 27. Ministry of Industry, Trade and Tourism, IDAE Savings Action Plan and Energy Efficiency 2011-2020

2.3.3. The country's energy objectives for 2020 + expected contribution of the construction sector

A. The country's energy goals for 2020

Objective: 20% of the energy consumption will come from renewable energies by 2020.

The contribution of renewable energies to the gross final energy consumption in Spain is estimated for 2020 by 22.7%, almost three points higher than the mandatory target set by the European Union for their Member States, while the contribution of the renewable energies to the production of electricity will reach 42.3%, with which Spain will also exceed the target set by the EU in this area (40%). (Source: IDAE, Renewable Energy Plan 2011-2020)

In a first estimate, the contribution of renewable energies to the gross final energy consumption of 22.7% is equivalent to a renewable energy surplus of about 2.7 million tons of oil equivalent (toe).

Objective: 20% increase in energy efficiency by 2020.

Spain aims to save on the energy issue EUR 78.687M in this decade, the aim being to reduce our final energy consumption by 2% each year. The implementation of the measures contained in the Plan will mobilize some investments worth EUR 45.985M, which will contribute significantly to job creation.

In 2020 Spain expects to achieve primary energy savings of 25.2 million tons of oil equivalent (25.200 ktep) in total over 2007.

Primary energy consumption in Spain stood at 146.615 ktep in 2007, so the total primary energy savings estimated for the year 2020 compared to 2007 values is 17.1%.

The energy efficiency goal as presented in 2007 refers to the absolute primary energy savings of 368 Mtep against 1842 Mtep projected consumption for 2020, leading to an EU target energy consumption of 1474 Mtep. Current projections show that the energy savings of only 206.9 Mtep could be achieved in 2020.

AT	7,2	EE	0,7	IT	27,9	PT	6
BE	9,8	GR	2,7	LT	1,1	RO	10
BG	3,2	ES	25,2	LU	0,2	SE	12,8
CY	0,5	FI	4,2	LV	0,7	SI	n.a
CZ	n.a	FR	34	MT	0,2	SK	1,6
DE	38,3	HU	3	NL	n.a.	UK	n.a.
DK	0,8	IE	2,8	PL	14	EU27	207

Figure 28. Estimated primary energy savings for 2020 per country

Objective: 20% reduction in CO2 emissions by 2020

Spain aims to prevent the emission of 400 million tons of CO_2

The measures proposed for the achievement of this goal are:

- Diversification of energy supply sources, development of infrastructures, transparency and competition in the energy markets, the growing participation of renewable energies and efficiency programs and energy efficiency.

- Compliance with the commitments of Spain to the EU level, according to the Renewable Energy Directive and the Effort Sharing Decision between Member States. National target minimum renewable energies share in the gross final energy consumption of 20% in 2020. The renewable energies share in all the forms of transport in 2020 will be at least equal to 10% of the final energy consumption in the transport sector.

- General objective of reducing the primary energy demand on the trend scenario in the absence active policies for savings and energy efficiency, consistent with the objective set for the European Union of 20% in 2020 and with the objectives of reducing emissions of greenhouse gases assumed by Spain. These objectives will be consistent with those established by the Spanish energy policy to achieve a final energy intensity improvement of 2% average annual in 2010-2020.

B. Expected contribution of the construction sector

The country's energy objectives for 2020 + expected contribution of the construction sector are set out in the Savings Action Plan and Energy Efficiency 2011-2020.

Objective energy reduction in the building sector: 11.5%

Adding the building and the Equipment, a reduction of 15.6% is pursued, due to measures related to the thermal enclosure: the heating and lighting, the high energy rating, and the appliances' Plan Renove.

For the 2011-2020 period, the **Savings Action Plan and Energy Efficiency** 2011-2020 forecasts several measures that will tend to reduce both the energy demand for heating and cooling (improves the thermal enclosure of the buildings), such as to improve the energy efficiency of the energy-consuming air conditioning and lighting facilities. For new buildings, the strategy will focus on promoting high energy rating of buildings (classes A and B) and in the development of a specific plan for buildings with energy consumption almost zero. As regards the domestic or commercial equipment it will focus on improving the energy efficiency of the appliances and the commercial refrigeration facilities.

Due to the low expectations of new building construction in the 2011-2020 period (3.7% growth in the 2011-2020 period) the construction Class A and B buildings and of buildings with energy consumption almost zero resulting from the transposition of European directives will be very limited and their weight in relation to the building stock will be low.

Second, the rehabilitation of buildings, which could be another way to improve its energy rating, is not expected to reach a large number of actions.

Regarding the degree of penetration of the energy-consuming equipment, both for the domestic sector and for the service sector, it is expected to grow due to the increased penetration of appliances and electronics.

Because the population is expected to increase to 1.1 million in the 2011-2020 period, the domestic consumption projections to 2020 in terms of final energy, point to a growth in the building sector consumption weight on the final energy consumption in energy uses going from 26% in 2010 to 28% in 2020.

It also provides for a reduction of 3% in the domestic sector energy ratio (toe/m2), because it simultaneously reduces power consumption by 2% and increases the constructed area in homes by 1%.

On the other hand, a reduction of 8.5% has been considered in the services sector power ratio (toe / employee), because despite the expected increase in consumption by 6%, the number of employees in the sector increases by 20%.

To achieve these savings in the Savings Action Plan and Energy Efficiency 2011-2020 the following measures are contemplated:

Measure 1: energy rehabilitation of the thermal enclosure of existing buildings

Objective: reduce the energy demand for heating and cooling of the existing buildings through the thermal enclosure energy rehabilitation as a whole or in any of the elements that compose it.

Time frame: 2011-2020

Measure target group: individuals or legal entities, of a public or private nature (owners or holders of buildings, public or private promoters, communities or neighborhood associations, municipal housing companies, energy service companies etc.).

Responsibility and collaborators: the bodies responsible for the implementation and monitoring of the measure are the Ministry of Industry, Tourism and Commerce / IDAE and the Ministry of Development, in collaboration with the Autonomous Communities.

Actions and planning: for this, reform or rehabilitation actions should be made of the thermal enclosure of the existing buildings, affecting 58.1 million m^2/year of constructed surface.

In total it contemplates rehabilitating the enclosure of 581 million m^2 of constructed surface, for this it will require an investment in efficient technology cost overrun of EUR 5.594M.

Support to be managed by the public sector. The support to be managed by the public sector estimated for the drive and promotion of this measure has been obtained as a range of contribution to a percentage of the total investment required, since the rest of the investment will be made without support as the effect induced by the impulse of this measure in the sector. The support to manage by the total public sector in the 2011-2020 period would be EUR 1.109,5M, EUR 1.109,5M a year over a period of 10 years.

Measure 2: improving the energy efficiency of the heating systems in the existing buildings

Objective: reduce the power consumption of the thermal installations of heating, cooling and DHW production of the existing buildings.

Time frame: 2011-2020.

Measure target group: individuals or legal entities, of a public or private nature (owners or holders of buildings, public or private promoters, communities or neighborhood associations, municipal housing companies, energy service companies etc.).

Responsibility and collaborators: the bodies responsible for the implementation and monitoring of the measure are the Ministry of Industry, Tourism and Commerce / IDAE and the Ministry of Development, in collaboration with the Autonomous Communities.

Actions and planning: the development of this measure to improve the energy efficiency of the thermal installations of the buildings will require actions over 8.200 MW thermal a year, in hot/cold production, distribution, regulation and control and air conditioning equipment. What will mean for the entire Plan to act over 82.000 MW thermal, for which it will require an investment in efficient technology in cost overrun of EUR 7.258M.

Support to be managed by the public sector: the support to be managed by the public sector estimated for the drive and promotion of this measure has been obtained as a range of contribution to a percentage of the total investment required, since the rest of the investment will be made without support as the effect induced by the impulse of this measure in the sector. The total support to be managed by the public sector in the 2011-2020 period would be EUR 283M, **EUR 28,3M** a year over a period of 10 years.

Measure 3: improving the energy efficiency of the interior lighting installations in existing buildings

Objective: reduce the power consumption of the existing interior lighting installations.

Time frame: 2011-2020

Measure target group: individuals or legal entities, of a public or private nature (owners or holders of buildings, public or private promoters, communities or neighborhood associations, municipal housing companies, energy service companies etc.).

Responsibility and collaborators: the bodies responsible for the implementation and monitoring of the measure are the Ministry of Industry, Tourism and Commerce / IDAE and the Ministry of Development, in collaboration with the Autonomous Communities.

Actions and planning: Improving the energy efficiency of the interior lighting installations will mean to act over 200 million m2 of constructed surface in buildings of the tertiary sector during the plan period, which will require an investment in efficient technology cost overrun of EUR 8.763M. In addition to this action it will be necessary to replace 34 million incandescent lamps with efficient technologies in the domestic sector, a process that should occur naturally, due to the restrictions on its marketing imposed by the EU.

Support to be managed by the public sector: the support to be managed by the public sector estimated for the drive and promotion of this measure has been obtained as a range of contribution to a percentage of the total investment required, since the rest of the investment will be made without support as the effect induced by the impulse of this measure in the sector. The total support to be managed by the public sector in the 2011-2020 period would be EUR 192M.

Measure 4: construction of new buildings and comprehensive rehabilitation of existing ones with high energy rating

Objective: reduce the energy consumption by promoting new buildings and rehabilitation of the existing ones, with high energy rating.

Time frame: 2011-2020

Measure target group: individuals or legal entities, of a public or private nature (public or private promoters, municipal housing companies, energy service companies etc.).

Responsibility and collaborators: the bodies responsible for the implementation and monitoring of the measure are the Ministry of Industry, Tourism and Commerce / IDAE and the Ministry of Development, in collaboration with the Autonomous Communities.

Actions and planning: promote the construction and energy rehabilitation of buildings worth 8,2 million m^2/year, i.e. 82 million m^2 during the period of the Plan, with an investment in efficient technology cost overrun of EUR 4.868M, to execute the necessary technological measures to move from an energy rating that meets the minimum energy efficiency requirements.

Support to be managed by the public sector: the support to be managed by the public sector estimated for the drive and promotion of this measure has been obtained as a range of contribution to a percentage of the total investment required, since the rest of the investment will be made without support as the effect induced by the impulse of this measure in the sector. The total support to be managed by the public sector in the 2011-2020 period would be EUR 788M.

Measure 5: *construction or rehabilitation of buildings with energy consumption almost zero*

Objective: promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero

Time frame: 2011-2020

Measure target group: individuals or legal entities of a public or private nature, owners or holders of commercial refrigeration facilities, energy service companies, etc.

Responsibility and collaborators: the bodies responsible for the implementation and monitoring of the measure are the Ministry of Industry, Tourism and Commerce / IDAE and the Ministry of Development, in collaboration with the Autonomous Communities.

Actions and planning: for this, the actions must be promoted to improve the energy efficiency on a block with an installed capacity of 1 MW power/year in industrial refrigeration, i.e. 10 MW power throughout the period of the Plan, with an investment in efficient technology cost overrun of EUR 20M.

Support to be managed by the public sector: the support to be managed by the public sector estimated for the drive and promotion of this measure has been obtained as a range of contribution to a percentage of the total investment required, since the rest of the investment will be made without support as the effect induced by the impulse of this measure in the sector. The total support to be managed by the public sector in the 2011-2020 period would be EUR 5M.

Measure 6: *improving the energy efficiency of the appliances*

Objective: reduce the power consumption through the improvement of the energy efficiency of the appliances or, more generally, of the domestic equipment block of energy consumers.

Time frame: 2011-2020

Measure target group: individuals or legal entities of a public or private nature who replace an appliance.

Responsibility and collaborators: the bodies responsible for the implementation and monitoring of the measure are the Ministry of Industry, Tourism and Commerce / IDAE and the Ministry of Development, in collaboration with the Autonomous Communities.

Actions and planning: for this 300,000 appliances/year, i.e. 3 million appliances must be replaced during the Plan period, with an investment in efficient technology cost overrun of EUR 800M.

Support to be managed by the public sector: the support to be managed by the public sector estimated for the drive and promotion of this measure has been obtained as a range of contribution to a percentage of the total investment required, since the rest of the investment will be made without support as the effect induced by the impulse of this measure in the sector.

Below is a summary table of the construction sector by measures and equipment based on data from the Savings Action Plan and Energy Efficiency 2011-2020.

	Final energy savings (ktoe)		Primary energy savings (ktoe)		Emissions of CO_2 ($ktCO_2$) Avoided		Supports public management (M€)			Investments (support + private contribution) (M€)		
	2016	2020	2016	2020	2016	2020	2011-2016	2017-2020	2011-2020	2011-2016	2017-2020	2011-2020
1. Energy rehabilitation of the thermal enclosure of the existing buildings.	775	775	1.319	1.329	2.921	2.943	665,7	443,8	1.109,5	3.356,4	2.237,6	5.594,0
2. Improving the energy efficiency of the thermal installations of the existing buildings	908	908	1.546	1.558	3.424	3.449	169,8	113,2	283,0	4.354,8	2.903,2	7.258,0
3. Improving the energy efficiency of the indoor lighting installations in existing buildings	674	842	1.588	1.986	3.400	4.251	115,2	76,8	192,0	5.257,8	3.505,2	8.763,0
4. Construction of new and rehabilitation of existing buildings with high energy rating	224	247	425	473	901	1.002	472,8	315,2	788,0	2.920,8	1.947,2	4.868,0
5. Construction or rehabilitation of buildings of almost zero energy consumption	0,4	0,8	0,8	1,5	1,6	3,2	3,0	2,0	5,0	11,4	7,6	19,0
6. Improving the energy efficiency of the commercial cooling installations	0,8	1,6	1,9	3,8	4,0	8,1	3,0	2,0	5,0	12,0	8,0	20,0
7. Improving the energy efficiency of the appliances	92	92	216	216	463	463	300,0	200,0	500,0	480,0	320,0	800,0
Total buildings and equipment	**2.674**	**2.866**	**5.097**	**5.567**	**11.115**	**12.119**	**1.730**	**1.153**	**2.883**	**16.393**	**10.929**	**27.322**

Energy demand of buildings 2011	Final=	25.901	Primary=	35.846	(ktoe)
Energy that the buildings will require in 2020	Final=	23.035	Primary=	30.279	(ktoe)
% savings in 2020 compared to 2011	Final=	11,1	Primary=	**15,5**	%

Total annual investment in rehabilitation of enclosure=	559.400.000	euros/year
Annual Target of the Savings Action Plan and Energy Efficiency 2011-2020 (PAEE)	58.100.000	m^2/year
Total annual investment in rehabilitation of the building enclosure (public + private input support)	**9,63**	euros/m^2

Figure 29. Summary table by measures of the construction sector and equipment. Source: Savings Action Plan and Energy Efficiency 2011-2020

The implementation of rehabilitation activities of the thermal enclosure of the existing buildings at the rate of 58,100,000 m²/year of constructed surface would mean, if only houses were to be reformed and it is considered that the average size of the house in Spain is approximately 100 m² built, from 76 to 90 m² floor space according to INE, the reform of some 581,000 homes per year.

On the other hand, improving the energy efficiency of thermal plant actions over 8.200 MW thermal a year imply a reform of 328.000 to 273.333 houses considering that the typical power installed in homes is 0.025 to 0.030 MW. Therefore, of 581.000 homes to renew per year that were cited in the preceding paragraph, from 328.000 to 273.333 would need a comprehensive renovation that included the enclosure and thermal facilities.

This is, at first glance, a reactivation of the building activity in the context of rehabilitation and replacement of existing heating systems.

Since the amounts shown in the Savings Action Plan and Energy Efficiency 2011-2020 (PAEE) are too low (e.g. 9.63 Euros/m² for the energy rehabilitation of the thermal enclosure of the existing buildings), in this section the market prices for the energy rehabilitation of the metres to be rehabilitated are calculated according to measured rehabilitation 1 of the enclosure, i.e. 581 million m² of constructed surface, but applying the necessary reforms to meet measures 1, 2, 4 and 5.

Thus, we estimate the total investment in building and, thanks to this investment, the workers that the sector would require and the number of these to be trained to achieve the energy targets by 2020.

C. Investment associated with the rehabilitation of the building stock

The first question that arises according to information on the Savings and Energy Efficiency Action Plan 2011-2020 is that an investment is necessary for 58.100.000 m²/year of constructed surface.

If we take as a starting point that there is a need to reform **58.1 million m²** per annum and it is estimated that this type of reform could cost on average from **387 to 675 Euros/m2**; the results obtained show that there is a need to earmark approximately **EUR 22.485M to EUR 39.217M** per year to undertake such interventions.

		€/m² built	
		Low scenario Minimum cost required for compliance with the CTE	High scenario Cost for a comfortable compliance with the CTE
Opaque elements	External insulation	95	110
	Indoor cladding	20	25
	Filling chambers	25	30
Covers	Reversed	70	85
	Cladding, false ceiling	35	40
Hollow spaces[6]	Hollow spaces	252	360
Installing heating and DHW	Individual installation	100	120
	Collective Installation	75	90
	Generic (total)	**387**	**675**

Figure 30. Estimate of the approximate costs of the energy rehabilitation based on different construction solutions. Source: Savings Action Plan and Energy Efficiency and their Authors

This means allocating an investment ranging from **8.5 to 14.8% of the GDP** to the rehabilitation of buildings and replacement of facilities per year. The Spanish GDP in the third quarter of 2012 has been EUR 263.342M.

[6] In this case it has been estimated that action is required in only 70% of the hollow spaces in the building, since the other 40 has previously been replaced by the neighbors who either took advantage of renove plans of the CCAA, or have placed double windows.

If we consider that with the low scenario, the minimum to comply with the Technical Building Code is sufficient to reach 2020 energy targets, this investment is equal or higher than the housing investment that, according to the Bank of Spain, remained in Spain during 2003, as you can see in the chart below.

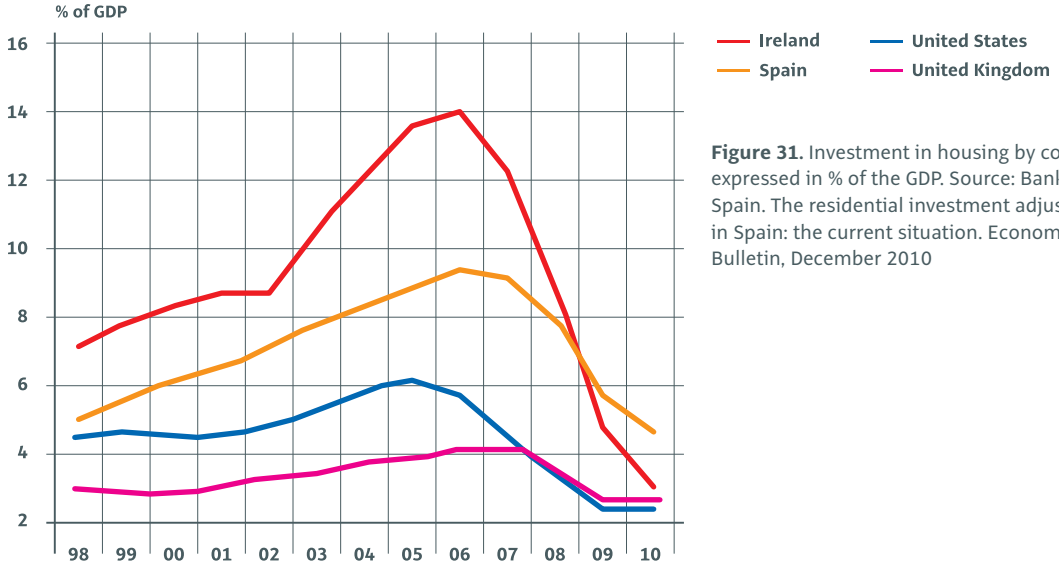


Figure 31. Investment in housing by countries expressed in % of the GDP. Source: Bank of Spain. The residential investment adjustment in Spain: the current situation. Economic Bulletin, December 2010

The reforms undertaken in terms of this low scenario should be expandable or compatible with other reforms to be carried out from 2020 to meet the substantially more ambitious goals for 2050. Because, although the building facilities become obsolete and are replaced in less time, other types of works and improvements that affect the building construction more, such as replacing windows or adding insulation, should be carried out when they are degraded or significantly decrease the performance of such elements, i.e., after several decades.

2.3.4. Number of construction workers to be trained in each sub-sector / occupation for each level of competence to meet energy targets in 2020

As noted above, in the third quarter of 2012, the number of employed in the construction sector fell according to the LFS to **1.136.800**, a lower amount than that recorded in the third quarter of 1989, more than 20 years ago . Most of those employed in the construction sector in 2012, specifically **905.644** workers, belong to building. Or what is the same, approximately 80% of construction workers work in construction.

CNAE specific to building and type of activity (CNAE 2009)	Nº of affiliates June 2011[7]	Nº of affiliates June 2012*
41.21 Construction of residential buildings	420.193	322.843
41.22 Construction of non-residential buildings	46.560	36.546
43.11 Demolition	73.746	59.033
43.21 Electrical installations	206.125	184.709
43.22 Plumbing, heating systems and air conditioning installations	102.134	91.664
43.29 Other facilities at construction sites	66.774	56.991
43.31 Plastering	26.856	22.188
43.32 Carpentry installation	30.158	28.661
43.33 Floor and wall covering	30.342	24.457
43.34 Painting and glazing	48.591	41.047
43.39 Other building completion	38.393	31.924
43.91 Roofing	7.645	5.581
TOTAL	**1.125.469**	**905.644**

Figure 32. Sectoral dynamics of the production system June 2011 to 2012. Source: Tripartite Foundation for Employment

[7] Notably, the number of members is not equal to the number of workers but slightly higher because one worker can work for himself and others, resulting in two employments at one time in the Social Security.

To find out the total number of workers that will be needed in 2020, we need to estimate the number of new workers needed by the industry for that date. If the demand in construction in Spain were to grow to meet the 2020 targets, we can say that all the new workers would engage in conducting work related to energy efficiency and renewable energy installations in construction, except for a small group dedicated to the finishing touches of the undertaken works.

As is clear from the table below, approximately 82% of the construction workers, totaling **742.975** in 2012, are directly related to energy efficiency and renewable energy installations in buildings.

CNAE Type of activity (CNAE 2009)	Nº of affiliates June 2011	Nº of affiliates June 2012
41.21 Construction of residential buildings	420.193	322.843
41.22 Construction of non-residential buildings	46.560	36.546
43.21 Electrical installations	206.125	184.709
43.22 Plumbing, heating systems and air conditioning installations	102.134	91.664
43.32 Carpentry installation	30.158	28.661
43.34 Painting and glazing	48.591	41.047
43.39 Other building completion	38.393	31.924
43.91 Roofing	7.645	5.581
TOTAL	**899.799**	**742.975**

Figure 33. Sectoral dynamics of the production system June 2011 to 2012. Source: Tripartite Foundation for Employment

To estimate the number of workers needed by the construction, it must be taken into account that the number of current employees, responding to a very weak demand for construction and rehabilitation of buildings, is lower than it was 20 years ago when Spain had about 7 million inhabitants less.

As shown in most of the statistics available of the sector, 1998 can be considered as the year where the figures for the construction soar, mainly due to the increase in residential construction. So, in that year there is a turning point, greatly increasing the number of active people in the sector.

The number of workers in the construction sector in the third quarter of **1998** was 1.409.600 according to the INE and we can estimate that 80% worked in construction, i.e. building that year had **1.127.680** workers.

However, the Spanish population has grown since that date to 7.176.528 inhabitants, i.e. Spain currently has a population **18%** more than in 1998.

If we extrapolate this figure to the number of construction workers and suppose that the natural number of workers in the sector, if the housing boom and the subsequent crisis, had not happened, is 18% more than in 1998, we would get that the construction should now have 202.982 workers more than in that year. That is, the number of construction workers in 2012 should be at least 1.330.662. 82% of those 202.982 construction workers would be directly related to EE and RES, i.e. 166.445 more workers should be incorporated to meet these needs.

As an increase in the Spanish population is not expected by 2020, but rather a stagnation or slight decline, we can give this figure as valid also for 2020.

The total number of construction workers is similar to the one with the sector in the year 1998, in the initial moments of the boom in residential construction, then this scenario can be considered as the **low scenario**.

	Total employed by the type of activity and nature of the activity. Units: thousands of people								
YEAR	1996 TIII	1997 TIII	1998 TIII	1999 TIII	2000 TIII	2001 TIII	2002 TIII	2003 TIII	2004 TIII
CONSTRUCTIÓN	1.254,4	1.316,5	1.409,6	1.610,3	1.756,9	1.897,8	1.980,3	2.120,5	2.283,0

Figure 34. Labour Force Survey. Detailed Results. Source: INE

On the other hand, we have previously considered that a minimum investment of 8.5% of GDP is required, comparable to the one carried out in 2003. In that year, and to meet this demand in which the number of construction workers was 2.120.500, and if we estimate the number of construction workers in 80% of that figure, we get that 1.696.400 workers would be required in total.

If we consider that 82% of the construction workers are directly related to EE and RES, we find that it would take 1.391.048 workers in total, i.e. **648.073** more workers.

That is, we can estimate that it takes between 166.445 and 648.073 more workers in building to meet the European targets for 2020.

Number of workers need to be trained in EE and RES

According to the data pointed to by the experts in the status quo analysis, it is estimated that of the total employed in construction, the percentage of workers who could be linked more specifically to energy efficiency and renewable energy use, will range - in the best scenario - between 25 and 35%, although this proportion may increase in the future if funding and surveillance had effective compliance with the standard.

If we take the estimated data in the previous section, in which are expected to be needed between **909.420 and 1.391.048** total workers in the building sector, it is reasonable to say that the training would be aimed primarily at this range from 25 to 35 % of workers more directly related to EE and RES in buildings. These percentages of training should cover both the new workers and those who are already engaged in such activities. Therefore:

Nº Workers to be trained in EE and RES			
Total Nº low scenario		Total Nº high scenario	
909.420		1.391.048	
25%	35%	25%	35%
227.355	347.762	347.762	486.867
Workers to be trained per year (2013 to 2020)			
28.419	43.470	43.470	60.858

Figure 35. Estimation of workers to train per year. Source: Authors

If we take the lower data of the interval of the low scenario and the higher data of the interval of the high scenario, we obtain that we must train between 227.355 and 486.867 trainers in total.

To find the number of workers per year, we will consider this time a different period to 2010-2020, which coincides with that specified in the call BUILD UP SKILLS. This period is 8 years, from 2013-2020.

Thus the number of workers to train per year will range between **28.419 and 43.470** in the low scenario and **43.470 and 60.858** in the high scenario.

Investment associated with the estimated training of workers

Assuming that at least the estimated workers were trained with an average of **90 hours** of training per worker, given between 2013 and 2020, with an average cost of **€11** per hour, we find that we would have to spend €990 on average per worker.

This involves an investment in training of between E**UR 28.135.181 and EUR 60.249.791 per year**. On the other hand, if it is estimated to be appropriate for the training and economically viable and have a group of 20 students per trainer, we get between 1.421 and 3.043 trainers will be needed in total.

Students trained in EE and RES in Professional training (2009-2010)	**7.164**
Nº workers to train in total in EE and RES in continuous training	
Low scenario [28.419 to 43.470]	21.255
Medium scenario [43.470]	36.306
High scenario [43.470 to 60.858]	53.694
Nº Trainers in continuous training	
Low scenario	1.063
Medium scenario	1.815
High scenario	2.685

Figure 36. Estimated number of students and trainers. Source: Authors

As 7.164 students already come from vocational training, it will be needed to train between **21.255 and 53.694 workers in continuous training** and it will be required to have roughly between 1.063 and 2.685 more trainers than those that already exist in the vocational training.

Most of the investment in training for construction workers (blue collar workers) must be public, through calls and State plans for bids or subsidized to companies. The training of construction workers with private funds in Spain goes to university students almost entirely. In addition, the professional certificates can only be delivered with public funds under the current legislation.

Unfortunately, the available data does not permit the identification of the exact number of construction workers to be trained in each sub-sector or profession. Indeed, one of the actions proposed for the roadmap, the observatory of training needs, would contribute to bridge this gap.

2.3.5. Qualification requirements: courses and itineraries required for the qualification, accreditation structures for conducting the training

Occupations with more emphasis on EE and RES applied to building according to the status quo with the greatest need for training[8]

Priority	Occupation	Score
1	Operator for sealing joints	4,36
2	Aluminum and PVC metalwork assembler	4,26
3	Thermal Solar Installations fitter	4,13
4	Mason	4,08
5	Installer for heat generation systems by harnessing geothermal energy.	3,97
6	Installer for heat generation systems by biomass combustion.	3,97
7	Plumber	3,92
8	Photovoltaic installations fitter	3,92
9	Authorized installer for ACS and air conditioning systems	3,84
10	Roofing and rainwater networks installer	3,83

Figure 37. Occupations in need of training. Source: Status quo

[8] We have removed from this table the professions comparable with each other, such as the Locksmith by being considered similar to Aluminum and PVC Metalwork Assembler. We have also removed the Quality Control and Environment Technician because it is an occupation that does not belong to the target group of the project.

Competency in EE and RES training needed according to Status quo

Measures to improve the buildings and equipment sector [9]	Competences according to the Status quo report	Occupations with the largest number of workers to train
Energy rehabilitation of the thermal enclosure of the existing buildings: 581.000.000 de m^2 of constructed surface for 2020.	• Aluminium and PVC joinery: mainly replacing the outdoor joinery. • External walls: isolation and elimination of thermal bridges • Covers: Isolation • Partition: isolation	1. Operator for sealing joints 2. Aluminum and PVC metalwork assembler 4. Mason Others: 7. Plumber 10. Roofing and rainwater networks installer
Improving the energy efficiency of the heating systems of the existing buildings: a total 82,000 MW thermal renewed from 2010	• DHW facilities • Plumbing installations • Air-conditioning systems • Gas installations	3. Thermal Solar Installations fitter 5. Installer for heat generation systems by harnessing geothermal energy. 6. Installer for heat generation systems by biomass combustion. Others: 8. Photovoltaic installations fitter 9. Authorized installer for ACS and air conditioning systems
Improving the energy efficiency of the indoor lighting in the existing buildings: 200 million m^2 of constructed surface in tertiary sector buildings and replacing 34 million incandescent efficient technologies in the domestic sector.	• Electrical production equipment •Electrical installations •Electricity production	

Figure 38. Competences in EE and RES training needed. Source: Authors

[9] Savings Action Plan and Energy Efficiency 2011-2020, approved on July 29th 2011 in compliance with the Directive 2006/32/EC of energy efficiency

Qualifications and associated training

Occupation	Qualifications available	Training available			Notes
		FR[10]	CP	FE	
Operator for sealing joints	No	☐	☐	☐	Need to establish a professional qualification as well as an associated certifiable training and employment training.
Aluminum and PVC metalwork assembler	Yes	☒	☐	☐	Need to establish an associated certifiable training and employment training.
Thermal Solar Installations fitter	Yes	☒	☒	☒	Cover with the current offer.
Mason	Yes	☒	☒	☒	Cover with the current offer. Need to include content in transversal themes of EE and RES
Installer for heat generation systems by harnessing geothermal energy.	No	☐	☐	☐	Need to establish a professional qualification, as well as associated certifiable training and employment training
Installer for heat generation systems by biomass combustion.	No	☐	☐	☒	Need to establish a professional qualification, as well as associated certifiable training
Plumber	Yes	☒	☒	☒	Cover with the current offer. Need to include content in transversal themes of EE and RES
Photovoltaic installations fitter	Yes	☒	☒	☒	Cover with the current offer.
Authorized installer for ACS and air conditioning systems	Yes	☒	☒	☒	Cover with the current offer. Need to include content in transversal themes of EE and RES
Roofing and rainwater networks installer	Yes	☒	☐	☒	The Certificate of professionalism is in draft.

Figure 39. Qualifications and training available and identification of needs. Source: Authors

[10] FR: Standard Education. CP: Certificate of Professionalism. FE: Employment Training

Operator for sealing joints: There is no specific qualification for this occupation's activities, so it is necessary to develop a new qualification or competency units associated with other related qualifications. There is also no formal training. If this qualification were to be developed, it would be advisable to design a certifiable associated training (Certified Professional). While implementing the certifiable training, we propose to design and offer training courses for employment to meet this need in the short term.

Aluminum and PVC metalwork assembler: There are related professional qualifications and formal training, but no certifiable training that you need to develop. While implementing the certifiable training, we propose to design and offer training courses for employment to meet this need in the short term.

Thermal Solar Installations fitter: There are specific qualifications, certifiable formal training and employment training. Therefore, in this case only we suggest providing the training offer available to meet this need.

Mason: This occupation is covered by the existence of several specific professional qualifications of the professional family of Building and Civil works. Some of them already have the corresponding Professional Certificate available and, in others, their official publication is imminent. There is also specific formal training. The problem detected here is that the qualifications and associated training do not explicitly consider building under Energy Efficiency criteria. Therefore, in this case it is suggested to include contents on Energy Efficiency in the different training designs, as well as design and offer specific training courses for employment aimed at meeting this need.

Installer for heat generation systems by harnessing geothermal energy: There is no specific qualification for this occupation's activities, so it is necessary to develop a new qualification. There is also no formal training. If this qualification were to be developed, it would be advisable to design a certifiable associated training (Certified Professional). While implementing the certifiable training, we propose to design and offer training courses for employment to meet this need in the short term.

Installer for heat generation systems by biomass combustion: There is no specific qualification for this occupation's activities, so it is necessary to develop a new qualification. There is also no formal training. If this qualification were to be developed, it would be advisable to design a certifiable associated training (Certified Professional). While implementing the certifiable training, we propose to design and offer training courses for employment to meet this need in the short term.

Plumber: This occupation is covered by the existence of several professional qualifications specific to different professional families. Virtually all of them already have available the relevant Professional Certificate. There is also specific formal training. The problem detected here is that the qualifications and associated training do not explicitly consider installation under Energy Efficiency criteria and specific content on Renewable Energy Systems. Therefore, in this case it is suggested to include contents on EE and RES in the different training designs, as well as design and offer specific training courses for employment aimed at meeting this need.

Photovoltaic installations fitter: There are specific qualifications, formal training and certifiable training for employment. Therefore, in this case it is suggested to only provide the training available to meet this need.

Authorized installer for ACS and air conditioning systems: This occupation is covered by the existence of several professional qualifications specific to different professional families. Virtually all of them already have available the relevant Professional Certificate. There is also specific formal training. The problem detected here is that the qualifications and associated training do not explicitly consider installation under Energy Efficiency criteria and specific content on Renewable Energy Systems. Therefore, in this case it is suggested to include contents on EE and RES in the different training designs, as well as design and offer specific training courses for employment aimed at meeting this need.

Roofing and rainwater networks installer: There are specific qualifications and the appearance of the Associate Professional Certificate is imminent. The problem detected here is that the qualifications and associated training do not explicitly consider under Energy Efficiency criteria. Therefore, in this case it is suggested to include contents on Energy Efficiency in the different training designs, as well as design and offer specific training courses for employment aimed at meeting this need.

Structures of accreditation

Note that the people, who make a certifiable training course, receive after passing, a professional certification that certifies their qualifications in the subjects taught.

In addition to this, the National System of Professional Qualifications and Professional Training has a recognition procedure, evaluation, accreditation and registration of professional qualifications, which aims to recognize and accredit those competences acquired by the person by way of non-formal and informal learning. The competences acquired through non-formal training would be credited in this way.

Structures for training

In addition to the public professional training centers that offer, mainly, formal initial training of the professional families related to EE and RES, there are institutions such as the **Construction Labour Foundation** (non-profit organization founded by the most representative social partners in the construction sector) that has more than 42 training centers accredited by the competent authority for the delivery of certifiable training in different fields related to energy issues, which guarantees enough coverage of facilities and resources for training the number of workers of the building sector required in the Status quo report and this roadmap.

2.4. Identified barriers to achieve the 2020 targets

2.4.1. Economic barriers

Economic crisis and reorientation of the activity

The construction sector is one that has been most affected by the economic situation, which has led to lack of demand, job losses and blocking the financing, among others.

All the interviewees share the vision of a paralyzed industry, whose opportunity to reactivate mainly focuses on the rehabilitation of the building stock, especially in terms of energy efficiency. However, despite the role of the rehabilitation as an alternative for the sector, particularly important regarding energy efficiency, experts believe that there are elements that hinder such reorientation of the sector:

- First, by the very nature of the rehabilitation work, smaller than those of a new construction, the jobs linked to it, they will not be able to generate as many jobs as those destroyed.
- The complexity of the tasks to perform in work rehabilitation, where work is needed on elements that are already built in limited spaces, with tight deadlines, etc., requires training in many cases higher than the work of a new plant.
- The type of company that undertakes these works of lesser magnitude than of a new construction, are small companies, which, although they are the majority of the companies in the sector, they are precisely those who have greater difficulty obtaining financing and to improve the qualification of its workers.

• The Legislation that can affect the rehabilitation of buildings is very broad, with different ordinances, laws, decrees, etc., of a different territorial area and, in many cases, discordant, like the Land Act or the Sustainable Economy, the Construction Planning or Urban Leases. This regulatory uncertainty makes it difficult for to undertake rehabilitation projects.

• In this sense, the lack of coordination between the various agents and administrations with jurisdiction in the matter stands out. The role of all the administrations involved and the various agents involved in the sector is key, but difficult to coordinate.

• We must also consider the lack of demand for energy rehabilitation by the end customer, i.e. the owners, who must finance with their means, at least one part of the investment. Due to the difficult economic situation, the lack of private financing, low environmental awareness, etc., only invests in those elements that are grant-awarding programs such as Renove plans.

Blocking funding and lack of demand

One of the most problematic aspects linked to the economic crisis, is blocking the funding, which has only aggravated the situation in the sector.

This lack of funding has stalled the demand for floors leaving a large stock of unsold buildings. The promoters have a lot of product that they are not able to get out because of financial difficulties. There are ghost town neighborhoods where hardly anybody lives and where, in addition, almost no one will want to live because there are no basic services.

Similarly, the banks, the energy service companies, the rehabilitation companies and the end users may consider that to invest their capital in specific rehabilitation projects is a relatively risky activity, as well as complex.

In the current situation, in which the main problem is centered in the short term, the potential future savings obtained from the rehabilitation become intangible. In this sense, one of the perverse effects of the crisis is the reduction of future investment.

2.4.2. Administrative barriers

SMEs access to training

This same argument to reduce future investment is exposed, as well as a brake of the activity, as a barrier to training.

In a paralyzed industry, with an eye on the immediate future, and with a trend towards more complex sub-activities, training investment becomes uncertain. Mainly because an important part of the SMEs of the sector do not know the grant channels to training, and also because many of the small and medium companies of the sector do not know what they need and where their needs are headed.

One problem evidenced by the experts is the difficult access to subsidized training by freelancers. Through the Autonomous Communities there is a subsidy line, for example, in the competitiveness plans. Also through the business associations, you can find tailored training plans for the self-employed. However, their access is very limited due to the insufficient dissemination of plans, as well as the lack of adaptation to their needs.

Thus, in the supply training, which is the subsidized training to which the SMEs and self-employed - if they access, - offer training of a transversal nature, this demand training being the most specialized but to which, however, the large and small companies generally access and not the small companies. All of this implies that the training to which the SMEs are accessing is not an impact on the competitiveness of their company.

Lack of guidance

Experts agree that there is not enough demand for training in the lower levels of qualification, and when there is, it is not adequate. In this regard, we have to consider that the professional training supply is created according to that which is most in demand and currently does not seem to be consistent with the needs that experts detect in the field. Therefore, career guidance is particularly relevant, especially in training centers and companies. The main problem is to reach the lower levels of qualification, because they do not know what they demand in the sector, how it evolves and where to find information.

Delay in the titles and accreditations

Due to the characteristics of the sector and its workers, experts agree that the certificates of professionalism, prepared by the State Public Employment Service (SEPS) in collaboration with national reference centers, are a key element to meet the training needs of the industry. However, the administrative delay by the agencies in charge of publishing the degrees can be a deterrent to training. There is also an additional problem which consists of the insufficient network of accredited centers, which slows the development of training aimed at the certificates of professionalism.

2.4.3. Structural barriers of the sector

Traditionalism of the sector

The construction sector consists, like the rest of the economic activities of the country, of SMEs and microenterprises. In the majority of small production units in the sector, traditionalism and low industrialization predominate, although this is not true in large companies.

In the current economic context, of little activity, it would seem wise to take advantage to improve the educational level of the workers. In this regard, it should be noted that non-formal training activities, both training for employment and training in the business, tends to be in this sector below the average of the whole economy.

However, one would assume that if the companies were to detect an increase in demand for specialization in the field of energy efficiency, they would show a greater interest in being trained and accredited. Nonetheless, the reality is that, today, the industry is not demanding energy efficiency.

Outsourcing

The reality of the construction is that in their production processes it covers a wide variety of stages with a large number of companies involved and a large number of workers with different professional profiles.

Big companies rarely have workers on staff profiles below the "site manager"; from there to the lowest levels, the workers provide outsourced SMEs. It is therefore in the SMEs, where the real need for training resides, although experts point to the responsibility of the big businesses when it comes to demanding the qualification of the outsourced workers and even, it raises the possibility that it is they who take the training of these professionals. Mainly because the relationship between the size of the company and the realization of training actions is directly proportional: for the workers in a SME the access to training is more complex than for the workers of a large company, which usually has a training plan.

The outsourcing of different activities to third parties, involves a marked division of tasks that, while it allows productivity to increase, it involves a risk of dispersion of the control over the implementation of each of the phases and loss of the overview of the project, with a resultant decrease in the involvement of workers.

It is quite likely, moreover, that the high degree of outsourcing, make precarious jobs and low-skilled labor staff invisible. Even more so when the contracts for work do not allow sufficient continuity periods of the templates in construction companies to a large extent.

Responsibility of Construction Companies and Promoters

The large construction companies and promoters have, and have had, in the opinion of most experts, a great responsibility in the situation of building in Spain. In the few cases where the CTE has been applied in the construction of buildings, these have been limited to the minimum application of that legislation, responding only to sustainable specifications required for the same.

The explanation focuses mainly on the lack of demand. This is while the sustainability and the energy efficiency do not imply an added value and a differentiating element for the construction companies and promoters; they will not invest in this matter beyond what is required by Law, for reasons of profitability.

However, experts believe that the existing regulations, if implemented effectively, would suffice. But, even though the legislation is broad enough, there is no effective control over the application of it on site.

Thus, even when there is social responsibility on the part of the large construction companies and promoters, and they include designs and efficient materials in their projects, then their correct development, application or installation is not monitored by the project management of the works,, altering the potential energy advantages that the design and materials could provide.

2.4.4. Educational and cultural barriers

Low initial qualification of the workers

In the construction industry there is a clear polarization of the workers: on the one hand, a group of highly qualified workers, on the other, a salary mass with no training. The production of work has been traditionally nourished by workers from school failure, which leads, in general, to a lack of initiative and lack of interest in specialization.

The workers in the lowest levels of the sector do not have the habit or motivation to favor their training, so the mandatory training in energy efficiency is seen as desirable, above all to cover the lowest levels of qualification, where for different socio-cultural reasons, the workers hardly access training for themselves.

Motivation

Due to the economic situation facing the country and especially this sector, in which training does not translate immediately into an improvement in employment, the motivation of the workers towards training is scarce. These motivational problems can be extended to the self-employed and micro-SME of the sector.

Despite the fact that training can improve the qualifications and acquisition of new skills, on many occasions it is not enough to motivate the effort required. The obligation or the need for the accreditation of qualifications stands out as an important driver.

Language of immigrant workers

The construction sector employs many foreign workers, although many of them speak the language, there is a significant proportion of workers who do not understand Spanish, so they can hardly have access to the training that develops

3. Strategy and methodology for the development of the roadmap

3.1. Strategy

3.1.1. Introduction

The strategy for the development of the roadmap has been established based on three fundamental pillars:

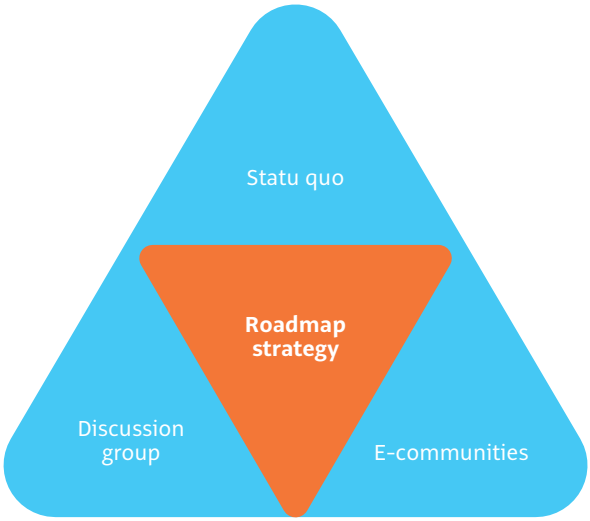


Figure 40. Pillars for defining the strategy for the development of the roadmap

3.1.2. Statu quo

The status quo analysis has been the fundamental base for the establishment of the roadmap. Specially, the conclusions related to the occupations identified as the most important, the competences related to Energy Efficiency and Renewable Energy Systems identified as key in the construction and rehabilitation of buildings, the related training, and finally, the identified barriers to achieving energy objectives, have been crucial for their establishment.

3.1.3. Discussion group

Based on the analysis of the main conclusions derived from the Status quo analysis, there was a discussion group whose purpose was to define the major topics that were to set different actions for the roadmap, as well as the various tools for its development.

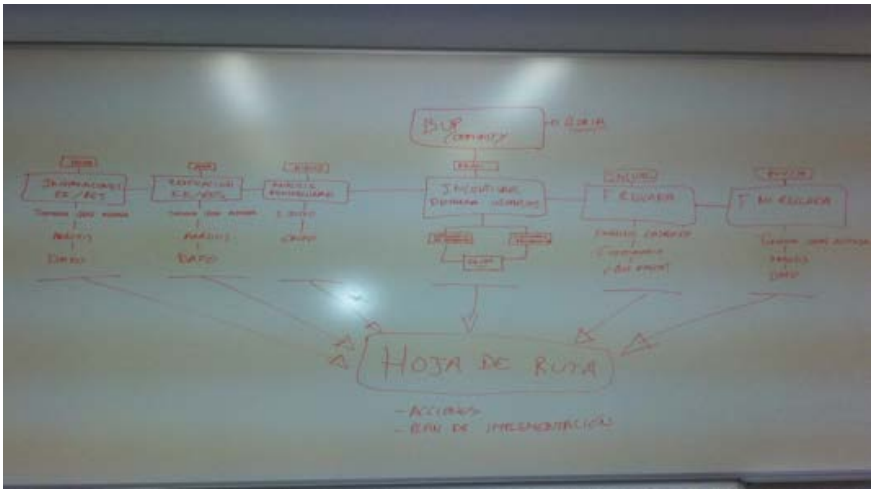


Figure 41. Detail methodology for defining the roadmap

During this meeting it was decided that the various actions in the roadmap would have to answer the following key issues:

- Profitability analysis
- Building under energy efficiency criteria
- Renewable energy facilities
- Professional Qualifications
- Training for Employment
- Stimulation of the demand of the homeowners

3.1.4 BUILD UP SKILLS SPAIN Platform. E-communities

With the aim of responding to the key issues and develop the roadmap, the BUILD UP SKILLS SPAIN platform has been implemented and which has served as a virtual meeting point of interaction in order to promote and strengthen the support of the project, as well as to define the roadmap on the accreditations related to energy efficiency and renewable energy sources. Therefore, the platform has acted as a means to contribute to achieving the road map and start the process of ratification.

The community has been implemented with Blackboard technology which is a next-generation platform, among other advantages; it allows its use on mobile devices like tablets or smartphones.

Figure 42. Devices to use the platform

The structure of the platform is shown in the following graph:

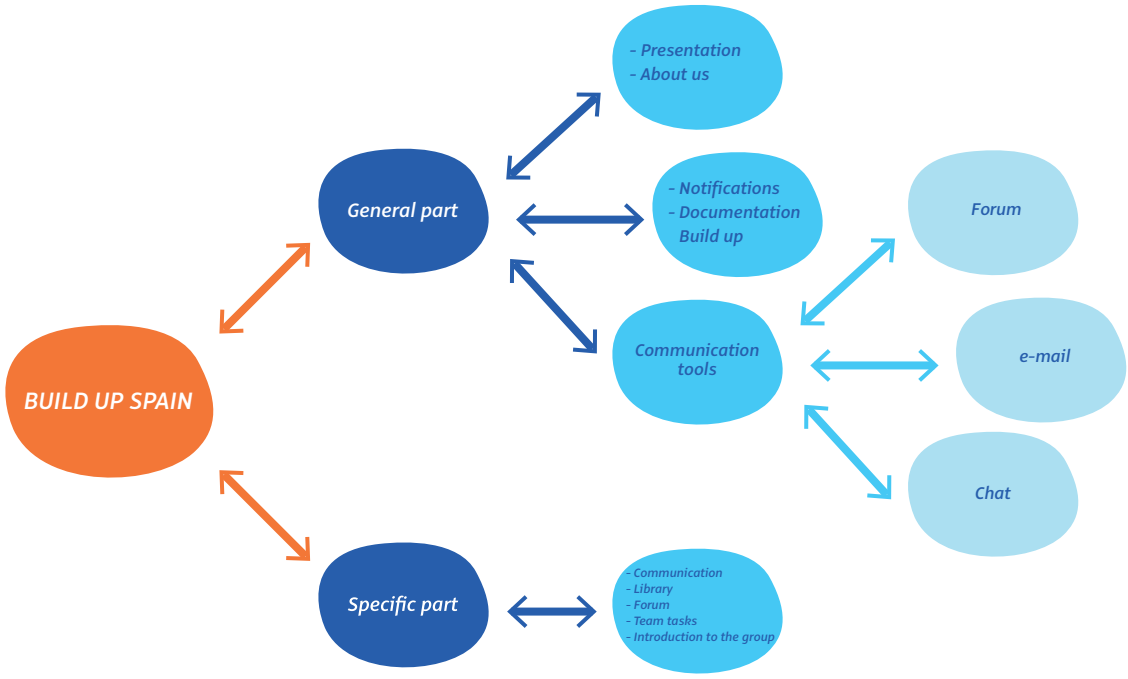


Figure 43. Structure of the BUILD UP SKILLS SPAIN platform

3.2. Methodology

3.2.1. E-communities

In order to work on each of the key issues and, therefore, define the roadmap, we have established six virtual communities, each of them with a specific methodology designed taking into account the specificity of the subject in question.

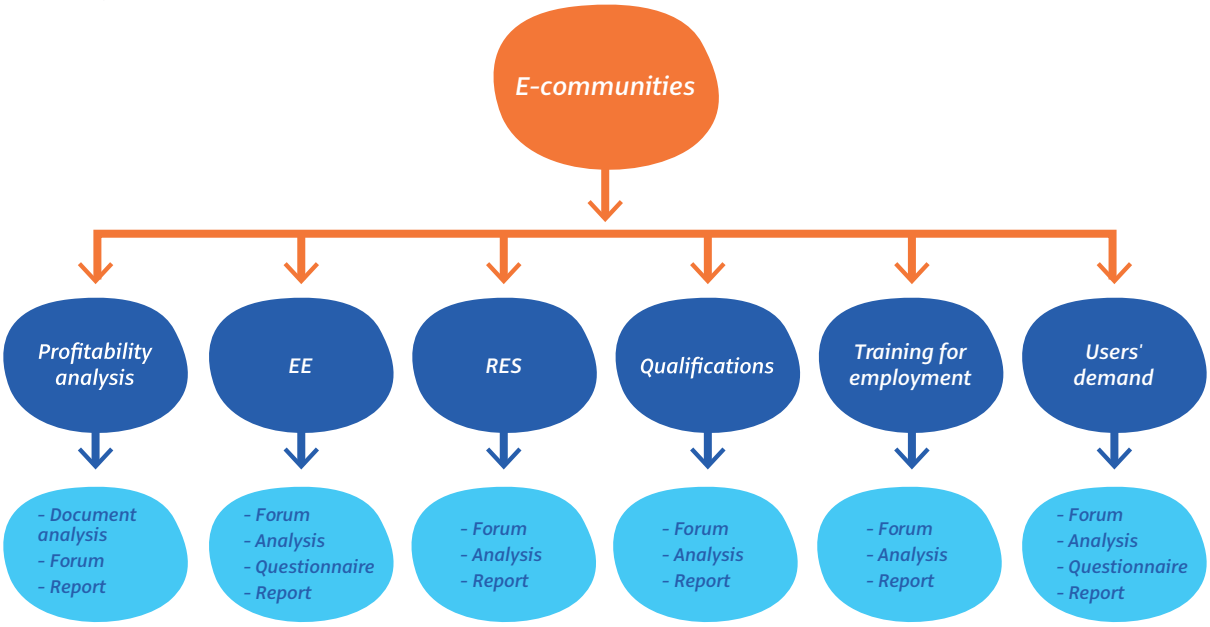


Figure 44. Methodology of the e-communities

Notably, the platform has been managed by a community manager and each of the communities has been directed also by a skilled person in the area thereof. 38 professionals from various fields, experts in different topics to study have participated.

3.2.2. Results

Profitability Analysis

Manager	Alfonso Cadenas, AIDICO
Objective	Study the profitability of implementing EE and RES measures in buildings.
Work Methodology	**Analysis of key documents** Two documents were uploaded to the platform in order to serve as an initial point of discussion for the purposes of this community. - Profitability Analysis of Energy Efficiency - Work Methodology
	Forum lines - Are you missing an important factor not adequately considered in the document? - Are these appropriate documents to establish cost-effective measures in relation to EE and RES? - Successful cases or studies related to this topic that should be included in the report on profitability. - Analysis of the "Spanish Plan for the rehabilitation of existing homes" - What is your opinion regarding the economic profitability of measures implementing EE and RES in buildings?

Results
Two discussion papers have been made available to the participants on which to focus the topic of discussion: *The first of them represents the philosophy of the group profitability analysis, as well as a report on the economic future impact of energy rehabilitation in the existing housing stock in Spain.* *The second document provides energy efficiency measures, analyzed from the point of view of their profitability, to detect the most suitable learning strategies to properly implement these actions.*
Lack of Profitability ***R1.*** The adoption of energy efficiency measures in buildings represents, in many cases, an additional economic effort compared to the traditional construction methods. The information to end users of the buildings means bringing profitability studies and tools for their implementation.

Training need

R2. The training of construction professionals involved to implement these energy efficiency strategies is essential to ensure the validity of economic feasibility studies.

R3. Energy efficiency measures are applicable, in general, both in new buildings and in the existing ones (energy rehabilitation strategies). These actions cover all the elements of a building:

- Thermal and Building enclosures.
- Technical installations.
- Renewable energy (both of new systems as of the integration in the existing facilities).

R4. Therefore, the specific training proposals affect virtually everyone involved in the implementation and maintenance of the buildings:

- Project Managers: Supervise in depth those determining tasks on energy efficiency in buildings: (Installation of the thermal insulation layer, implementation of gaps, awareness of the importance of the treatment of thermal bridges, etc.) as well as to involve operators involved in this work.
- Masons: Proper installation of the insulating layer and treatment of integrated thermal bridges and contour, reducing air infiltrations due to construction defects in enclosures, etc.
- Roofers and inner lining operators: Treatment of the insulating layer in inner partitions, wall lining execution, etc.
- Thermal installers, electricians and plumbers: Installing energy production equipment and configuration of the optimal operating conditions. Special attention to the parameters governing the operation of renewable energy facilities.

R5. The training measures must be eminently practical, but a minimal theoretical training on energy parameters seems essential and, especially, for the awareness of the professionals involved in the economic factors that will determine the profitability derived from making a good job. These initiatives should be integrated into the training plans of the courses for the certificates of professionalism and informal training.

Repayment time and profitability

R6. Each building has its own specifications and special features. Therefore, they must be studied in detail. The energy efficiency measures adopted in new buildings, because of their increased usage time have a wider economic payback, so the long term measures must be considered. The energy rehabilitation of the existing buildings has, as a key economic indicator, the repayment time.

R7. In newly constructed buildings, you should evaluate the costs of operation and maintenance of the energy efficiency measures. It is therefore necessary to study the existing alternatives in energy production (including RES) and energy pricing in the use stage. In this sense, training related to energy efficient in buildings is fundamental.

R8. In existing buildings, in addition to the above conclusion, the cost of the initial investment is added as an economic indicator determinant of economic profitability. It is essential to establish an ambitious program with an economic impulse to the energy rehabilitation that encourages better conditions for this initial payment and, therefore, improve the profitability of these measures:

- •Grants and subsidies to cover (fully or partially) the initial investment.
- Tax benefits (deductions and reduced tax rates, etc.)
- Access to concessional loans (low interest rates, vesting periods, etc.).

Housing Rehabilitation Plan and GDP

R9. About the plan to rehabilitate the existing homes, the general opinion is that the figures of investment required to achieve the objectives set pose too high a percentage in relation to the Spanish GDP. Therefore they do not represent an achievable reality today and, if a similar plan is implemented, it would be executed under a much reduced economic framework respect to the theoretical amounts.

Actions and proposed recommendations for the roadmap	
Actions	
R2 **R3**	1. Training Program on the economic parameters that determine the profitability of the actions in energy efficiency in buildings.
R4 **R5**	2. TA on the impact on the consumption and energy billing that occurs when tasks are properly executed in building.
Recommendations	
R6 **R7**	1. Assigning an economic value to the reduction of CO_2 emissions in the homes that has economic benefits for the promoter of the reform.
R1 **R8**	2. Destination of economic resources by the government, to promote the adoption of cost-effective EE measures for the end user.

Building under energy efficiency criteria

Manager	Ana González, FLC
Objective	Analyze the effects that the application of passive building elements could have on the energy efficiency of buildings.
Work Methodology	**Forum lines** - New European directive 2012/27. Energy rehabilitation policy. Are these two documents adequate to establish profitability measures related to EE and RES? - Energy certification of existing homes and demand stimulation. - Innovation in energy efficiency. - Selection of labels and brand image volunteer certificates - Selection of milestones for 2020
	Questionnaire Once these issues are worked in the forum, a questionnaire was passed to 9 experts for them to provide their views and validate the conclusions reached.

Results

FORUM LINES

New Policy 2012/27/UE. Rehabilitation aids and energy policies

R1. Under the policy, the public sector will have to renew the 3% of the buildings they own or occupy after July 2015.

Each member state will have to prepare a "roadmap" to ensure energy efficiency ahead of 2050 of commercial, public and residential buildings.

The directive also requires large companies to undergo an energy audit.

Energy suppliers should also ensure before January 1st 2015 that the billing information is correct and based on actual consumption.

R2. The Member States shall take appropriate measures to promote and facilitate the efficient use of energy by small customers, including households.

> *a) A range of instruments and policies designed to promote a change in habits, among which may include: i) tax incentives, ii) access to financing, grants or subsidies, iii) providing information, iv) exemplary projects and v) activities in the workplace;*
>
> *b) The different ways of involving consumers and consumer organizations during the possible provision of smart meters by communicating information on: i) profitable changes and easy introduction to the use of energy, ii) energy efficiency measures.*

Energy rating of the existing buildings and activation of the demand

The draft of the energy efficiency certificate of the existing buildings does not specify that the owners of more inefficient buildings will be forced to take measures. Will it be enough that the rating is public in the buildings offered for sale or rent and that the users can compare them so that owners decide to do works?

R3. It has become customary that the advances in the field of energy efficiency are achieved at the stroke of rules rather than by their own will and awareness of the property owners, as perhaps the first question would be whether the tenant of a property actually perceives as beneficial a lower energy rating.

In short, it would be desirable that the new RD includes the obligation to make reasonable energy improvements in the building to reach certain levels, since by choice of the tenants it is difficult to be made, except in specific cases.

R4. It is not sure it's necessary to force, except perhaps in extreme cases or in buildings of large consumption. As for the residential sector, the image given in the housing estate portals with low score may be sufficient to affect prices and the market and activate the demand in specific cases.

R5. However there is a large quota of properties of which the intention of the tenants is not to sell, or even when not all the residents of the building are motivated by the increase in value of their homes (most of the works for energy improvement must be general to be effective).

It is in these cases where I believe that the State incentives will have more room to promote the rehabilitation of the energy sector.

R6. The GTR's annual report (Working Group on Rehabilitation) makes two proposals to obtain funding to finance other rehabilitation work and activate the demand, based on the experience of other EU countries (UK specifically):

> **1. Assign a value to CO_2 reductions.** Otherwise there will be no way to find financing flows aimed at CO_2 reduction.
>
> **2. Force the companies supplying gas and electricity** to invest in the buildings of their customers so that they can reduce the energy consumption, having as an objective a percentage reduction target.

R7. As a "complement", given in Annex III of the model of energy efficiency certificate (which is already a Recognized Document), the technician who signs it must raise and quantify measures to improve the energy efficiency of the building.

It is an example of how the future entry into force of RD could serve as a driving mechanism for the implementation of energy efficiency strategies and assume a helpful tool for decision-making of property in this regard.

R8. The subsidies and tax incentives would have a great impact on the efficiency of the existing building.

Innovation in energy efficiency

After the prospective study (Delphi Status quo) it was concluded that there does not seem to be a consensus among experts regarding the positive influence of R & D in improving the efficient systems in the building.

R9. A problem that has been detected in relation to the R & D, regardless of the economic situation, has been the lack of technology and knowledge transfer of the Universities and research centers with companies.

This coupled with the lack of funds for R & D itself and that the private sector does not have the resources required to undertake R & D projects, seems that this matter is somewhat stagnant.

To transfer this information to the end user of the buildings, in a clear and understandable way, is perhaps the Achilles heel in this whole process.

Tags and certified volunteers

Apart from mandatory certificates there are labels, certificates or voluntary standards, such as Passive house / Passivhaus, "Minergie" Low-energy House (BBC), High Energy Performance Label, LEED and some more. These certificates to what extent will these stamps help to overcome the traditionalism that characterizes the building sector?

R10. Spain is slow, since there is not too much information about it and the promoters of these actions may not perceive the added value. This, together with the condition of voluntariness, does not seem to motivate the investors enough.

It is an element that can be advertised and make the construction of a building to be an "event" with media coverage. Private initiatives that make use of these environmental certificates foster the interest of the users and the development of the sector, helping to break that traditionalism and providing the feeling that "is no longer constructed as before."

In fact, a good training strategy for unskilled agents would expose the requirements included in these standards and propose solutions for their successful implementation.

R11. The area of Levante is seeing how the new construction housing are being able to market still, a significant percentage are acquired by foreigners from different countries (Germany, UK, Nordic countries and most recently Russia are the most common). They can be a more familiar target public with these certifications.

Milestones 2020

In your opinion which will be the five major milestones in achieving the energy objectives for 2020 in Spain. How will they contribute to overcome the economic, administrative, structural, cultural and educational barriers for achieving these objectives?

R12.

- The energy rehabilitation of existing housing stock.
- That the new construction work finishes assimilating in their implementation processes the regulatory changes that were made 5-6 years ago (CTE and RITE), since it is of little use to have excellent standards and a great project if it fails in the execution of the work.
- The social awareness.
- The involvement of the State with a strong focus on this issue.
- Take into account the useful life of the building once it is built, the proper management of its facilities and consumption either in a new construction or an existing building

R13. GTR's annual report (Working Group on Rehabilitation) at the CONAMA Foundation Fair makes a very interesting analysis of the housing to be rehabilitated:

The profound reform of 10 million homes in the country until 2050 -to reduce its heating costs by 80% and cover 60% of the hot water needs- can generate about 130,000 new jobs in the first phase from here to 2020. To do this, it is true that it requires a total investment of EUR 5.000M-10.000M per year of public and private funds at an extremely complex time. However, this amount is compensated by the energy savings and the avoided CO_2 emissions.

R14. It is true that the energy consumption and the emissions have been reduced in Spain due to the economic crisis. The closing businesses, the increase in energy poverty in the homes, lower vehicles on highways, etc. result in the decrease in consumption. The problem is that if no action is taken, when the economy reactivates, this will increase consumption, since it is not due to improved energy efficiency but to a lack of activity.

R15. To achieve the annual target Savings Action Plan and Energy Efficiency 2011-2020 of the PAEE, we must reform 58.100.000 m²/year. This, according to data from the General Directorate of Land Registry, is equivalent to approximately 13% of the building stock. If we divide the EUR 10.000M a year between 58.100.000 m²/year, I get that we must invest 172 Euros/m². That is, for a house of 100 m² we have to invest 17.200 Euros. If, for example, it has four bedrooms, kitchen and living room, it has 7 windows. Each window class A costs about 800 Euros, 5.600 Euros already. The efficient watertight boiler costs about 2.100 Euros. Insulate the interior walls only 2.000 Euros (20€ / m²), with the consequent loss of space, so it does not seem an option that many people will choose. Insulate the outside walls only 9.500 Euros (95€ / m²), this seems a better choice.

5.600 + 2.100 + 9.500 = 17.200 Euros.

Renewables, or equivalent efficiency technology, better not to talk. After this reform would exceed 25% of the façade area which does not meet the Technical Building Code.

QUESTIONNAIRE

R16. In order to know the opinion of the experts with regard to the investment to be made in the rehabilitation of housing to meet the energy targets for 2020, as well as the investment that should start to move to train construction workers, we worked with nine expert assessments by questionnaire (see annexes), in order to refine the proposed actions in the roadmap as much as possible. The results are shown below:

Questionnaire "2020 target overcoming barriers." Results

1. Do you think that the minimum price estimated in 387 Euros/ m² built for energy rehabilitation of a building so as to meet the CTE, approaches reality?	
Yes	44,4%
No, the amounts are too low. The actual price is higher.	22,2%

No, the amounts are too high. The actual price is lower.	33,3%
More than 65% of the experts believe that the estimated minimum price for energy rehabilitation of a building is not appropriate or that this price should be higher.	
2. What percentage of the total expenditure associated with energy rehabilitation of buildings and housing do you think will be addressed until 2020?	
Up to 25%	55,6%
From 26 to 50%	44,4%
From 51 to 75%	0,0%
From 76% to 100%	0,0%
100% of experts believe that only as much to 50% of costs associated with energy rehabilitation of buildings until 2020 will be addressed.	
3. How do you think the energy rehabilitation costs associated with the great buildings of a sole owner until 2020 will be financed?	
Through public investment mainly	0,0%
Through private investment mainly	44,4%
Through public and private investment similarly	11,1%
I do not know how the expense will be financed	44,4%
Since public funding is very limited by the crisis, more than 44% of the experts believe that the funding for energy rehabilitation of large buildings will come from one private owner.	
4. How do you think the expenses associated with energy rehabilitation of housing until 2020 will be financed?	
Through public investment mainly	0,0%
Through private investment mainly	44,4%
Through public and private investment similarly	33,3%
I do not know how the expense will be financed	22,2%
Since public funding is very limited by the crisis, more than 44% of the experts believe that the funding for energy rehabilitation of housing will come from one private owner.	
5. Do you think it's reasonable to say that to undertake the reforms necessary in order to meet 2020 energy targets will require approximately 500.000 workers in the building?	
Yes	33,3%
No	66,7%
66% of experts believe that the figure of 500.000 workers in the building to meet 2020 energy targets is not reasonable. The reasons are:	

6. Why is it not reasonable to consider the figure of 500.000 workers in the building?

1. This is a generalization that does not have the advances in mechanization of the tasks to improve the thermal enclosure of the buildings. All the technical developments aim to reduce the labor required.

2. Because it is calculated by adding workers engaged in rehabilitation while maintaining the number of those who were engaged in building. By being practically nil the new construction will not increase the number of workers, it will remain the same and they will be redirected to rehabilitation.

3. Today the reality is not close to the forecasts of the activity that is necessary to promote the rehabilitation of buildings. The arguments are on the table but lack investment capacity. The revitalization will come because: accessible form to credit, grant lines, rising fossil fuel (a war in the Middle East?) credits, expectations and stability...

4. It will never undertake the total amount, it will be gradual.

5. Because with the current economic situation, the small increase of industry and other production processes, overall growth and thus economic resources, they will not allow the dedication of money for the purpose posed.

6. Because there will be no investment (funding) enough for this type of work.

It seems that the experts do not consider reasonable the figure proposed mainly by the crisis situation and credit crunch and investment activity is suffering, which is hampering the demand for rehabilitation of buildings.

7. Do you think it's reasonable to say that to undertake the reforms necessary in order to meet 2020 energy targets it will be necessary to train between 334.945 and 593.740 workers, most of them construction (blue collar workers)?

Yes	77,8%
No	22,2%

About 80% of the experts consider that the proposal for workers to train to meet 2020 energy targets is reasonable.

8. Why don't you consider reasonable the need to train a number of workers between 334.945 and 593.740?

1. More, it's a small figure.

2. It's not a training issue, but resources

9. ¿Crees que es adecuada la asociación mostraba en la tabla anterior entre competencias profesionales y las medidas para mejorar el sector edificación y equipamiento e cara a cumplir los objetivos energéticos de 2020?

Sí	77,8%
No	22,2%

Over 77% of experts believe that the association between professional competencies identified in the Status quo report and the measures to improve energy efficiency of buildings and facilities is adequate.

10. Why don't you consider the association between measures and competencies adequate?

1. It is very general

2. I do not understand the meaning of competence in the table, so I cannot answer the question

Actions and proposed recommendations for the roadmap	
Actions	
R15 **R16**	3. Schedule training for employment: "Placing indoor and outdoor insulation and sealing joints according to CTE construction workers"
R15 **R16**	4. Action training for employment: "Energy efficient enclosures of hollow façade with aluminum and PVC metalwork.
R15 **R16**	5. Itinerary for employment training "Installation and maintenance of highly efficient heating and hot and cold water systems for installers "
R15 **R16**	6. Action training for employment: "Energy efficiency in buildings"
R15 **R16**	7. Action training for employment: "Installation of lighting systems according to CTE for installers"
Recommendations	
R6 **R10** **R11**	3 Establish tax benefits to companies and individuals who undertake energy rehabilitation measures in their assets.
R5 **R8**	4. Basis of a new system of grants based on efficiency targets
R3 **R4** **R7**	5. Legislation of the energy certification of existing buildings

Installations of renewable energy systems

Manager	Óscar Redondo, AM Arquitectura
Objective	Analysis of the effects on the overall energy efficiency of a home by improving or upgrading energy installations in buildings, both from non-renewable sources, as the execution of facilities that use renewable energy.
Work Methodology	**Forum lines** - Regulations and subsidies - Research, development and innovation and new technologies - Rehabilitation or new construction in consolidated urban areas - Electric energy consumption - Technologies RES predominant and associated training
	Analysis Once all these questions were worked in the forum, the technical team conducted an analysis of the input, producing key results and associated actions.

Results

Regulations and subsidies

It starts from the recognition that the current path of energy development in Spain is not sustainable in the Medium term, with an excessive reliance on oil that the country is not able to produce and therefore has to be imported from abroad.

R1. The installations must adapt to each building, clearly differentiating between interventions in existing buildings and new buildings, buildings in large cities or isolated towns.

The regulatory impulse is considered essential as a basis of minima ensuring the implementation of more efficient energy systems and renewable energy input in buildings.

R2. We value the CTE-HE4 impulse not only in its most direct incorporation of solar thermal panels, but equally in its field of application which allows their replacement by other renewable sources, which opens the door to the use of biomass, geothermal, etc.

R3. It is necessary to turn towards heating systems of low temperature to allow a more rational use of energy by radiating surfaces (floors, ceilings, etc.).

R4. It is more appropriate to direct subsidies under actual demonstration of its effectiveness, not by type of systems, since a good measure in a particular case may not be in another. In this regard the training of installers to select the most appropriate energy saving measures is particularly interesting.

In any case, we consider the example that the own public administrations should lead by example being the first to implement energy saving systems.

Research, development and innovation and new technologies

Improving the energy efficiency of facilities optimize the performance of the facilities, leading to incorporate new production systems (boilers, heat pumps, etc.), distribution, control or broadcast.

R5. The use of high performance heat pump systems, which as in the case of geothermal energy, could compete with the rest of RES, even if they are subject to low temperature systems, what it does in the case of rehabilitation of buildings, they are in off-market principle (except for the generation of hot water consumption).

R6. It is necessary to bet on management and control systems that allow the building to use different energy sources and control them through a switchboard that selects the font you most like according to the external and internal conditions, and the cost of energy.

These systems of RES hybridization with traditional energy may pose a future development path through the path of improvement presented. Its main current problem is in its high cost and the need to centralize the installation to obtain a palpable improvement in energy efficiency of the building.

R7. The current crisis in the construction industry combined with the lack of information that the ultimate consumer has about the benefits to invest in energy efficiency make the R & D in the sector stagnant or fail to arrive at residential buildings, which constitute around 80% of the housing stock of the country.

Rehabilitation or new construction in consolidated urban areas

The more widespread public opinion is that renewable energy sources, only play a minor role in the solution to the problem of energy sustainability, but do not have the capacity to become the main factor.

Although it is possible to construct new buildings that work only with renewable energy, converting an existing building on 100% renewable seems particularly complex in most cases.

R8. It assumes the low possibility of achieving 100% supplied buildings with renewable energy since most of the same pose an intermittent supply and therefore must be supplemented by traditional sources (gas, electricity, etc.).

R9. It points to the complexity of implementing renewable energy in consolidated urban areas, in buildings already constructed, whose facilities require major investments to be reformed.

R10. It points to the use of biomass as a substitute system of coal-fired boilers, diesel and LPG, as both share requirements for fuel storage space.

R11. Similarly, urban planning is addressed from the point of view of decentralizing production as a future solution (District Heating).

R12. There are three principles of action in this line:

- Reduce energy demand in the building, without affecting comfort
- Centralize production of heat and cold
- Right-facility energy management, for which lack qualified personnel.

Electric Power Consumption

The increase in electronic appliances and refrigeration systems in residential buildings, combined with the economic fabric of offices, retail and industry of our cities, make power consumption a key factor in achieving the goals of 2020.

R13. It is considered that the electricity consumption in buildings is discussed from the equipment, i.e. appliances, lamps, etc. Only in commercial buildings with high electricity consumption, this issue is considered within the guidelines for energy savings, mainly due to the high cost of the electronics.

R14. This legal loophole exists in the systems of self consumption as a possible way out of the photovoltaic sector, provided that the legislative changes in net energy balance benefit its implementation.

R15. Cogeneration initiatives are considered feasible in buildings with continuous use of thermal systems (e.g. swimming pools). In the residential case it is not considered as a profitable investment.

RES technologies predominant and associated training

It is necessary to foresee what kind of energy installations will have a greater demand in the construction of the next few years, determining which of them will have a higher market share and to anticipate what the occupations will be most in demand in this regard.

R16. It proposes the use of biomass in heating systems in isolated urban areas as an alternative to Diesel and LPG.

R17. It will also develop technologies based on high performance heat pumps: geothermal, aerothermal and solar thermodynamics.

[12] Gas Licuado del Petróleo

R18. Is not considered that any RES take a dominant position, rather than in terms of the building will be more or less convenient the choice of each resource.

R19. Overall the figure of the auditor and energy manager will first boom thanks to the development of European Directives in the field, and second by the economic cost saving that will mean in residential and commercial buildings with centralized systems. They will accommodate more and more in the market the energy services companies that will require installers with expertise in various heating and cooling systems, both renewable and traditional.

Actions and proposed recommendations for the roadmap	
Actions	
R1 R3 R5	8. Action training for employment: "The renewable energy systems in buildings"
R2 R5 R17	9. Itinerary training for employment: "Installation and maintenance of heat generation systems by harnessing geothermal energy"
R2 R10 R16	10. Itinerary training for employment: "Installation and maintenance of heat generation systems using biomass combustion"
R2 R17	11. Itinerary training for employment: "Installation and maintenance of aerothermal and solar thermodynamics for buildings"
R4 R6 R19	12. Itinerary training "Energy management of building facilities"
R5 R17	13. Training Itinerary: "Installation and maintenance of high heat pumps"
Recommendations	
R1 R14	6. Adjustment in housing self consumption of energy from energy

Professional qualifications

Manager	INCUAL
Objective	Propose actions to improve the National Catalogue of Professional Qualifications and its associated training on Energy Efficiency and Renewable Energies.
Work Methodology	**Forum lines** - National System of Professional Qualifications and Training. - National Catalogue of Professional Qualifications. - Accreditation of skills and professional regulation. - Specialized referred to the National Catalogue of Professional Qualifications.
	Analysis Once all these questions in the forum were worked, the technical team conducted an analysis of the input, producing key results and associated actions.

Results

FORUM LINES

The objectives of the Group of Professional Qualifications, according to the proposed methodology, were four, and according to the same four forums have been established and developed thematic expert meetings in the INCUAL. The conclusions are:

1. National System of Professional Qualifications and Training (SNCFP)

The aim here was to characterize thematic procedures whereby the qualifications become professional training offers of the SNCFP - in initial vocational training subsystems and employment - and their relation to qualifications systems VET of other EU countries.

We defined the following lines of discussion, with the following results:

How could we accelerate the SNCFP response to the needs of the productive sectors?

R1. On one hand, try to speed up the detection of new powers to incorporate the National Catalogue of Professional Qualifications (CNCP), strengthening the instruments available to the SNCFP to analyze the evolution of the productive sectors.

R2. On the other hand, the possibility of expediting the answer would be the simultaneity of processing procedures skills and tools to support the evaluation and accreditation, through the establishment of joint working groups with the presence of the various responsible for their preparation, and accreditation of the system.

Does the Information and Guidance System meet the needs of their receptors?

R3. The information and guidance is one of the actions defined in the SNCFP. It is carried out independently in each subsystem, featuring proprietary platforms that have limited information about the system as a whole and on gateways between the two subsystems and other educational sections. Consideration should also be taken regarding the information on regulated professions and activities.

How do you control the quality of the operation of SNCFP?

R4. Quality, as another action that will shape the system, it needs to be developed through initiatives related to innovation, continuous improvement, and taking into account the reference EQAVET (European Quality Assurance in Vocational Education and Training) proposed by the EU. Currently it is initiating an assessment of the system itself, involving different stakeholders represented in the CGFP, agencies with responsibilities in education and employment in the Central Administration and CCAA as well as Social agents.

Does the SNCFP respond to the current needs of professional mobility in the environment of the EU?

R5. Instruments have been established in the area of the European Union to encourage the mobility of workers within it, and which consist of matching the skills of professionals, including the European Qualifications Framework (EQF-also known by its acronym EQF-English) and ECVET European credit Transfer for vocational training.

However it is still pending to complete the link from the SNCFP with such systems, which would develop the Mechanisms to establish correspondences of our qualifications frameworks among themselves - the structure of 5 levels associated with the NCP, the Spanish qualifications framework (MECU) and Spanish qualifications framework for higher education (MECES)-, and with the European framework - EQF and "EQ-EHEA" (European Higher Education Area).

Also pending is to complete the equivalence between the respective training units by the credit system ECVET (European Credit system for Vocational Education and Training) and ECTS (European Credit Transfer and Accumulation System).

2. National Catalogue of Professional Qualifications (CNCP)

In this area the needs for revision and updating of the CNCP in terms of EE and RES skills in building have been addressed, both as potential competition involved identifying emerging outdated as those not covered, and in their case possible qualifications have not developed and are necessary. We have also considered the possibility of mainstreaming the powers or capacities for EE and RES.

The lines of discussion raised are:

Production / revision of family skills Energy and Water (ENA)

R6. Much of the Professional Qualifications ENA family is currently under mandatory review because their age -since its publication, is more than five years.

Also as mentioned in other lines of discussion, there may be issues or design regulations requiring the review, in particular the new regulatory requirements regarding the production of electricity from small power or microgeneration-, and new areas of competence not collected at the time.

Production / revision of qualifications of the family Installation and Maintenance (IMA)

R7. The IMA family does not present mandatory qualifications revision situation, but you could address crosscutting issues and regulations as well as new areas of competence.

Production / revision of the family qualifications in Building and Civil Works (EOC

R8. In the family there are two qualifications in EOC for mandatory review, but there are others - in particular the execution control of building works - that deserve special attention.

Production / revision of the family qualifications in Electricity and Electronics (ELE)

R9. In the family there are several qualifications in ELE for mandatory review, but also have to incorporate the new regulatory requirements regarding outdoor lighting and microgeneration.

What possibilities exist as to the mainstreaming of EE and RES skills?

R10. Mainstreaming, when responding to skills that can be applied to different professional contexts without differences, it has a very positive effect on the design of qualifications, allowing to optimize training and accreditation. They have shown potential for mainstreaming competencies in the following areas:

- Representation of projects using CAD applications.
- Assembly and maintenance of solar installations.
- Organization and supervision of the installation and maintenance of all types of facilities.

What needs of new skills in EE and RES exist in the CNCP?

R11. For regulatory requirements we have to pick up the skills relating to the assembly and maintenance of geothermal and microgeneration facilities and small scale heat pumps. In existing qualifications have been recognized needs of expansion and improvement in the treatment of such applications.

3. Accreditation of skills and professional regulation

The design of qualifications is conditioned by the existence of regulated trades and professions in the field of EE and RES in buildings, both national and European level. This in turn determines the supply and demand for training. It has addressed this issue in the following lines:

Is the relationship of qualifications, degrees, certificates, and cards compatible with regulated activities at national level?

R12. They have shown changes in European and State regulations on Professional Qualifications and regulated activities during the development phase, and subsequently both CNCP, as of the training based on the same (certificates of professionalism). These modifications allow to rethink the design of qualifications that were conditioned by those regulations prior-to-fit professional cards that are no longer in force.

Are the conditions of access known to EU labor markets and rest of the world for Spanish workers in the field of EE and RES?

R13. In order to encourage mobility of Spanish workers in labor markets in the EU and elsewhere, it is considered that it would be of great use an integrated information point to clarify the general and specific requirements for each business district.

Are the conditions of access known to the Spanish labor market of workers from the EU and rest of the world in the field of EE and RES?

R14. The access of foreign workers also benefit from an integrated information point which would back the necessary qualifications to perform regulated activities and professions Spanish labour market.

How effective is the system of recognition of skills acquired through work experience?

R15. The procedure for recognition of the skills acquired through work experience has a high degree of acceptance in the CCAA where it has been launched, and it has the advantage of economy and accessibility for workers. The number of calls in relation to EE and RES is low because there are a large number of workers without evidence of their professional experience.

4. Training Offer referred to the CNCP

The Build Up Skills project is proposed to evaluate the ability of the educational system offers training and employment, to adapt to changes in demand, particularly in the field of EE and RES. It has addressed this issue in the following two lines, centered on each subsystem:

Does the offer have the potential of professional training of the educational system to absorb the emerging demand in EE and RES?

R16. The high demand for workers during the construction boom did not make possible the training of the same, it is concluded that in the construction industry the number of workers who acquire their skills - in whole or in part, on the basis of formal training is reduced, as occurs with the initial training. At present the precariousness of work of the sector did not invite the achievement of these titles. In the families of IMA and ELE the situation is different; the number of workers with training is significant. In the family of ENA there were few workers entitled to be training cycles of recent introduction.

Does the offer have the potential of vocational training for employment, based on certificates of professionalism, to absorb the emerging demand in EE and RES?

R17. There are no exploitable data available to make statements about the real representation of the vocational training for employment in the labor market, which in turn affects the need for an observatory with ability to unify the statistics of training of the system as a whole.

Actions and proposed recommendations for the roadmap	
Actions	
R1 **R5**	14. Network monitoring and development of skills required by the production system in the national and EU levels."
R3 **R13**	15. Integrated platform of information and guidance in the area of the National Professional Qualifications and Training
R2 **R4** **R15**	16. SNCFP quality assessment
R6 **R7** **R8** **R9**	17. Review of existing qualifications in the field of building related to EE and RES.
R7 **R11**	18. Skills development and training associated certifiable assembly and maintenance of heating systems by harnessing geothermal energy.
Recommendations	
R4 **R5** **R15**	7. Increased procedures calls for recognition and accreditation of skills, in UCs related to EE and RES.

Formación para el empleo

Manager	María del Puy Jiménez, FLC
Objective	Establish specific actions aimed at improving the provision of continuous training related to Energy Efficiency and Renewable Energy applied to building.
Work Methodology	**Forum lines** - Propose actions to promote the accreditation of skills in the construction sector - Define measures to overcome economic, administrative, structural and education that have been detected in the analysis of status quo. - Develop an effective system of career guidance aimed at employed and unemployed - Designing effective measures to disseminate EE and RES training - Establish effective systems to detect training needs in EE and RES. - Analyse in depth the main features of the Training for Employment: demand management, the type of deals, the media, etc., proposing actions for improvement.
	Analysis Once all these questions are worked in the forum, the technical team conducted an analysis of the input, producing key results and associated actions.

Results

FORUM LINES

The objective of this online forum has been analyzing current management Mechanisms of non-formal vocational training and those with which they could improve their efficiency.

In addition, we analyzed the demand for unregulated VT, i.e., for example determining whether the current offer is capacity to meet skill needs identified in the Status quo.

Main characteristics of non-formal training: management, demand, supply type, media, etc.

R1. The efficiency of unregulated training passes for "cataloging" and organize this training offer and promote permeability and recognition of training developed "in company", part of the strategic model of human resource management of a company, and that provides much information about the actual trend in business professional profiles.

R2. The current trend of the administrations is to subsidize certifiable training, both in offering unemployed workers as employed. But it is necessary to promote a transparent and efficient system that responds both to improve the skills of workers and improved business productivity.

R3. The current means are considered insufficient for the fulfillment of the 20-20-20 targets. It is very sensitive cut in public funding for vocational training and employment in the current crisis many companies and workers do not understand the importance of investing in training.

R4. The following measures are proposed to improve the efficiency of training:

- Creating permanent sectoral observatories whose aim would be the training needs "just in time": this tool can be managed by educational institutions with state and sectoral implementation and funding could be provided by the Public Employment Service.
- Develop sectoral plans in response to the training needs "just in time", detected in sectoral observatories.
- Have the rules and procedures necessary to facilitate the training of professional certificates at private, without being subject to public subsidies. It is necessary to promote the flexibility of the system of vocational training for employment, accommodating both supplies derived from public funds, and private.
- Identify the quality of both the training and the training done. Quality indicators should be shared by all users and involved in the vocational training system for employment (public administrations, training centers, companies, workers ...).

Efficient mechanisms to detect needs

R5. As efficient mechanisms for identifying needs it highlights the role of permanent observatories to detect needs.

As for tools to use in the detection of needs, framed sectoral observatory, are mentioned:

- Standing Panel of companies' representative of the sector, with a 25% annual renewal. Establish a bi-annual Business consultation panel is a permanent source of information.
- Exploitation of data along with the analysis of economic indicators and activity.
- Having socioeconomic data collected in many cases regional agencies to detect new strategic niches that are linked to local development plans, emerging sectors in specific locations.

It is emphasized that the working methodology of the observatories should encourage the participation of regional institutions to provide knowledge of the details that have to do with the prospective economic analysis geoCharts different spaces.

R6. The processes of evaluation and accreditation of skills are another important way for detection of training needs in addition to activating the demand for training on the part of workers.

It is necessary that training centers can have an open and continuous training offer training both certifiable and non-certifiable training, covering the need to have enough people trained and qualified trainers for 2020.

Measures for the dissemination and awareness towards training

R7. The dissemination and awareness cascade on the importance of management skills, personal balance of skills acquired, designed and delivered training to acquire the necessary skills; passes have common tools and promote information and awareness professional networks whose purpose is also to promote awareness and dissemination in cascade.

Emphasize the importance of involving all stakeholders, administrations with competences in vocational training for employment, and labor administration Educational and training centers, and counseling centers points, and educate and inform about the results of the BUILD UP.

Therefore, within the proposals that are developed in the following line of argument, to improve career guidance systems and training includes dissemination and awareness towards the training.

Efficient system of career guidance for employed and unemployed workers

In this line of discussion is highlighted as career guidance seems a key to efficiently improve the skills of workers in EE and RES.

R8. As for the needs and requirements to efficiently develop guidance, based on the disparity of entities and estates with responsibility in this area, experts suggest that no one is currently doing the work of information and guidance aimed at reorienting career qualified workers in the construction sector who have lost their jobs, to areas where, predictably, there will be more job opportunities and activity.

R9. The development of an integrated guidance system should be approached from the perspective of the new system of Training for Employment, and should not be focused solely on the guidance and advice for training, but comprehensively to make career guidance and provide information and guidance on assessment of skills, training on new employment niches, orientation towards entrepreneurship and act as monitoring and impact service.

This integration involves establishing collaborative networks in which through collaborative work for sharing information on different areas of activity, employment, training, education, local, regional, state, through ICT tools, all stakeholders labour orientation share common objectives and lines of work that reflects in the improvement of information and guidance for employed and unemployed workers.

Propose measures to overcome economic, administrative, structural and educational barriers detected.

R10. Through the participation of experts, administrative and structural barriers have been mentioned that prevent many cases the efficiency of vocational training for employment and skills upgrading in EE and RES. Measures to overcome such barriers in the framed:

•Regulatory amendments:

- Opening for private delivery of certificates of professionalism
- Open calls for accreditation process skills acquired through experience and non-formal learning processes.
- Flexibility in the management of national qualifications catalog as a reference for the design of the supply of certificates of professionalism.

• Mechanisms for coordination of the various administrations: local, regional, state. Methodologies and tools that promote collaborative work and share information getting an efficient use of resources.

- Thematic networks of experts from both the administration and private entities that through ICT tools, statistical data can be shared socio-economic development, employment, local development projects.

• Flexibility and improving public financial management, control guiding the evaluation of measurable results.

R11. To overcome educational barriers recipients of non-formal training, these will be considered in the design of the plans. One of the advantages of allocating resources and ICT media for creating customized learning environments, adapting the information to different levels of students input to different input levels and have motivational resources to avoid the abandonment training.

R12. As economic barriers, at the present time of crisis, any measures proposed must be aware of the economic viability, suggesting procedures that alleviate these economic barriers.

A noted example, as a measure to address the lack of economic resources in the implementation of training plans:

1. Running a priority basic classroom training core group, that can transfer the lessons learned to other workers directly, for the work performed within the work. Establish a cascade training.

   We considered the key group responsible for work of small works and first officers. Also are those who longer stay in the work and have a global view of the process.

2. Complement basic training with self-training activities using ICT facilities such as simulators, visual resources, multimedia, through learning platform, so that it can reach more people.

3. Requalify the trainers in building specialties in the areas of EE and RES.

Propose actions to promote the accreditation of skills in the building sector

The accreditation of vocational skills is identified as a key and essential to raise the qualifications of the workers of the building industry. However there are many open accreditation processes and management of calls are slow.

Measures to promote the accreditation of professional competences, both acquired through experience and informal learning in EE and RES activities, are in many cases linked with the measures established to improve orientation processes as well as the measures to improve the efficiency of formation. Although reiterative include measures to promote the accreditation of competencies:

R13. Sort the supply of Training for Employment of face to be considered in the process of accreditation of competencies.

R14. Having a record of institutions guaranteeing also that these are accredited to give value "formal" his condition training institutions "unregulated" and enablers of accreditation. This is very relevant in an industry such as construction and linked as unstructured from a point of view of education in our country.

R15. Include, in the process of career guidance information on the skills acquired through experience and non-formal learning process, promoting skills management.

R16. Promote the participation and collaboration of the Administration with specialized sectoral institutions, and facilitate the entry of specialized sectoral entities that have the resources required to develop these assessments more efficiently, and count on your support to manage these processes. It could make cooperation agreements with these entities which would facilitate greater flexibility in the procedures and the possibility of periodic calls that respond to the expectations of workers.

There are already successful experiences in which associates vocational training in the administration, that have been active in accreditation processes contributing advisors, evaluators, and facilities and resources to carry out the tests.

Actions and proposed recommendations for the roadmap	
Actions	
R4 **R5**	19. Permanent observatory for prospecting building occupations and qualifications and training needs associated in EE and RES.
R7 **R9** **R16**	20. Thematic networks of experts from both the administration and private entities that through ICT tools, share information.
R12 **R6**	21. Designing a technique retraining schedule of trainers in EE and RES.
R6 **R12** **R13**	22. Training Plan "Construye 2020". Aimed at construction workers and trainers.
R11 **R12**	23. Design and development of professional certificates in e-learning.
R11 **R12**	24. TR multimedia for the installation of heat systems through the combustion of biomass.
R11 **R12**	25. TR multimedia for the installation of geothermal energy heat systems.
R11 **R12**	26. TR multimedia for the installation of RES as the aerothermal and solar thermodynamic.
Recommendations	
R1 **R2** **R3**	8. Establish training in EE and RES as priority issues in the call for plans offering grants for employment training.
R8 **R10**	9. Proposed regulatory changes in the system of training for employment.

Stimulation of the demand

Manager	Raúl Flores, FLC
Objective	Analyze what kind of actions and measures could be developed to stimulate demand for the home owners to implement EE and RES solutions in residential and non-residential buildings.
Work Methodology	**Forum lines** - Analyze the major causes that are at the basis of the low demand for energy efficiency measures and renewable energy in Spain - Identify specific causes of low demand for EE measures in buildings in Spain - Establish what the specific causes of low demand for renewable energy in buildings in Spain - Know what is the social knowledge about EE - Know what is the social knowledge about RES
	Survey Once these issues were treated in the forum, a survey was launched which aimed to see first hand what are the causes for a low demand for EE and RES activities and consider incentives to users to start the energy renovation of their buildings.
	Analysis Once all these questions were worked in the forum, the technical team conducted an analysis of the input, producing key results and associated actions.

Results

FORUM LINES

Low demand for energy efficient buildings

The transposition of the Directive and Directive 2010/31/EU 2012/27/UE the Spanish legal system will have a direct impact on building regulations as it should be reviewed in relation to energy consumption in buildings, whose energy efficiency requirements should be tightened.

Also, the design of buildings with almost zero energy consumption involve a revolution in the design and construction process of buildings highlighting, among others, the increased presence of passive (adjustable sun protection systems, natural ventilation, ...), for that will require the presence of multidisciplinary teams - planners, architects, engineers - working on the project since its beginning.

So while strict compliance with the conditions set out in the Technical Building Code would give a certain building around a C energy certification - according to calculations made with the computer program Calener, which determines the level of energy corresponding to a building - with the new directive would need to achieve a grade of A to meet the requirements set.

Based on the exhaustive status of CTE-HE, it seems that classes C and D are 90% of the buildings (35% in class C and 55% in class D). The remaining 10%, 5% which represents the most efficient buildings will be in Class B, while 5% less efficient buildings will be in the class E.

Into this context, it appears that end users simply accept the constructive characteristics marked by law, without there being a clear demand in this regard.

R1. Currently it seems that only the non-residential sector is the one that is demanding this type of buildings. The end user will currently only able to see a rating label, stamp or similar which will not even know how to interpret that means your building demands 15 Kwh/m^{2}year.

Thus, it is necessary to launch a campaign of information and social awareness to let people know that we are affecting directives, which are the Nearly Zero Energy Buildings and what it is to have energy efficiency in buildings.

R2. It seems that awareness alone will not be enough to stimulate demand although there were indications that it would be the most natural way for your encouragement, and would spread the knowledge that the economic advantages compared to over-compensate the initial cost required. In this sense, it seems that imposing rules are indispensable to encourage demand combined with information and awareness campaigns.

Social knowledge of renewable energies

What is the knowledge we have today in society on renewable energy installations and the various uses of these? It seems that the social knowledge of renewable energy is significantly higher than that of the building with energy efficiency criteria.

Renewable energies have permeated society, primarily solar and wind energy. On this basis, what is the image that end users have of these energies, especially regarding: usability, installation cost, yield and production, depreciation, individual and collective Profitability, etc..?

R3. This knowledge does not seem to be significantly higher. What certainly is very high or very positive is the image they have those energies among citizens. To all "it sounds good" that of renewable energies, but implies that at all adequate knowledge. What user knows the possibilities for installation, e.g., For photovoltaic on your roof? Who knows about regulation on consumption?

Social knowledge of energy efficient buildings

What is the knowledge that today's society has energy efficient buildings?

The data and references that we have obtained so far, suggest that there is a lack of knowledge by the end user of energy efficiency in buildings.

R4. The term energy efficiency is something that people work daily and therefore is only imposed on the non-residential sector by the obvious theme of reducing costs and consumption.

R5. For a change of attitude is more effective to work the emotions (greenhouse effect, global warming ...), and work on behaviors (consumption monitoring, data collection, calculations resolution) that simply disseminating information (information leaflet).

And in general, the rules have more impact than the awareness projects.

In any case, it seems that the greatest impact performance combine legislation and awareness (especially from childhood), as it would be more effective and constitute a problem shared by all.

R6. The exemplary on energy issues has to start by the government itself, which must implement the European Directive imposing the 3% renovation of public buildings, which should serve as an example for the ordinary citizen.

R7. Notably, people ask car consumption that he want to buy and instead, nobody is interested in the energy consumption of your future home. It seems that this "invisibility" of energy loss is at the origin of this lack of awareness. Also, the delay in the implementation of the energy label in Spain is a difficult situation not appreciably Provided incentives of the demand.

Low demand for renewable energy installations

The reality seems to indicate that end-users do not require the installation of renewable energy in its buildings, beyond compliance with current regulations.

Some consumers argue Profitability poor efficiency and of renewable energies and the high costs of maintaining them.

R8. For solar thermal, many users rarely know the real cost saving energy by using it. Also, in many cases the user does not care about its operation (in many cases do not even know if it works or not) and the maintenance is neglected or not performed. The very poor performance of many of these facilities promotes an image of immature technology, which does a disservice to renewables. The Solar Thermal triumphs when the user "sees" the savings will mean, for which not usually have the necessary tools.

R9. Although biomass for thermal uses thrives in Spain, is still seen as "exotic" with questionable quality, supply uninsured and not widespread and major problems worse performance when compared to gas. Nothing is further from reality. The demand is not increased despite the economic and environmental benefits arising from their use, mainly due to ignorance of the answers to these questions.

R10. Ignorance is latent in society that the low enthalpy geothermal and aerothermal can be deployed almost everywhere, with very high energy savings amortized facilities in just over 10-12 years. Who has heard of it is generally believed that specific technology specific areas where the subsoil has unusual thermal properties.

R11. On previous results some means to stimulate demand would be: push net savings guarantees by monitoring conducted in the new facility, tools that allow the user to know the saving energy in your home before and after rehabilitation, ambitious communications campaigns on dramatic growth in fossil fuel prices and the benefits of renewable thermal, CTE and RD new energy certification of existing buildings, increased European funding and lines of financing, tax breaks to those who install RES, white certificates, boosting exemplary management and regulation to encourage consumption.

SURVEY

R16. In order to know the opinion of the users with regard to the implementation of EE and RES measures and what are the causes that are at the base of a low demand, a poll step (see attachments) to owners housing, which was answered by 467 people. The results are shown below:

Opinion survey on energy efficiency and renewable energy. Results.

Rating aspects of housing

Among the aspects that respondents attach greater importance to when renting or buying a home is the welfare and comfort of home, followed by the low cost of maintenance and, thirdly, that the building is energy efficient and low cost of housing associated bills.

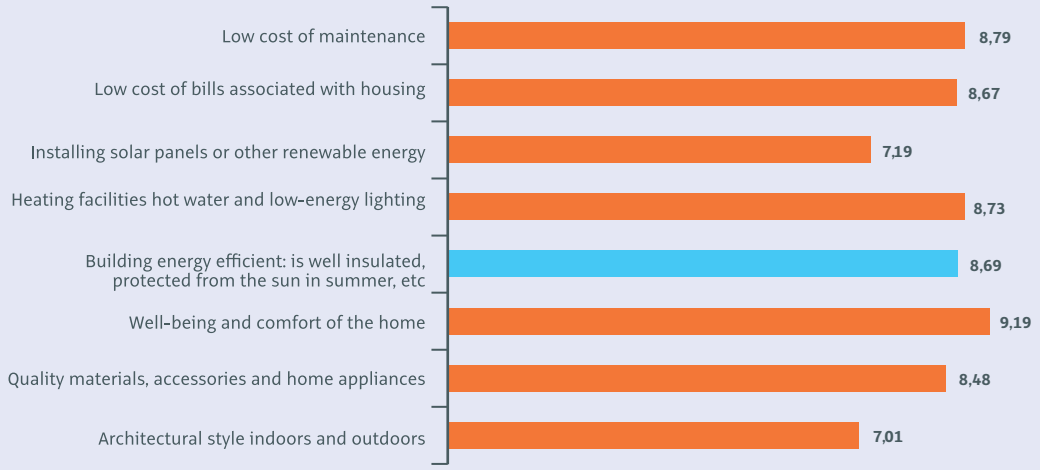


Chart 1. Rating aspects to which places greater importance when renting or buying a home (means, scale 1-10)

Housing costs

Seven in ten people know the amount in Euros that they pay per year due to total energy consumption, used for heating, hot water, lighting, etc.., of the house in which he resides.

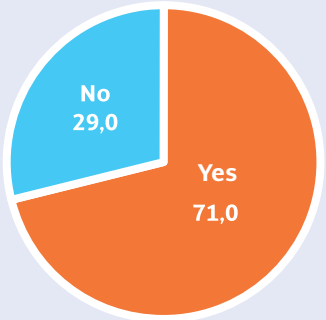


Chart 2. Knowledge of the amount in Euros that they pay a year due to total energy consumption, used for heating, hot water, lighting, etc.., of the house in which he resides (%)

Expenditure by area

Just over half know if energy costs of your home are high or low compared with other in your area.

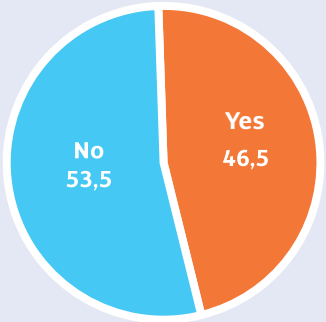


Chart 3. Knowledge of the energy cost of housing compared to others in the area (%)

Energy rating

Just over half of respondents have knowledge about what is the energy rating of a building or house.

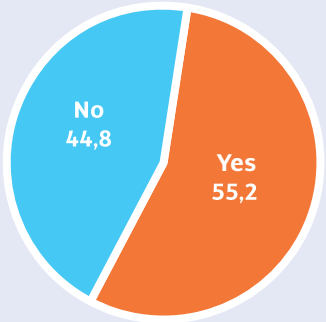


Chart 4. Do you know what the energy rating of a building or house is? (%)

Information on energy efficiency

Regarding the benefits of energy efficient buildings, more than two-thirds said to know.

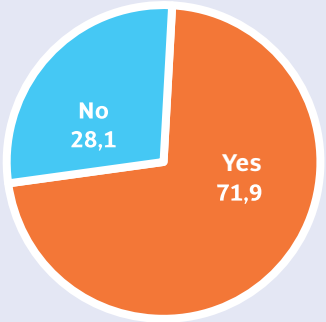


Chart 5. Knowledge of the benefits of energy efficient buildings

Economic benefits of the energy facilities and renewable energies

The opinion on the economic benefits or compensation the initial extra cost energy efficient housing is slightly higher than on houses that have facilities that use renewable energy, but both averages are above 7 points on a rating scale 1 to 10.

Do you consider that the economic benefits outweigh the extra initial energy efficient homes?

Do you consider that the economic benefits outweigh the initial cost overrun homes with renewable energy facilities?

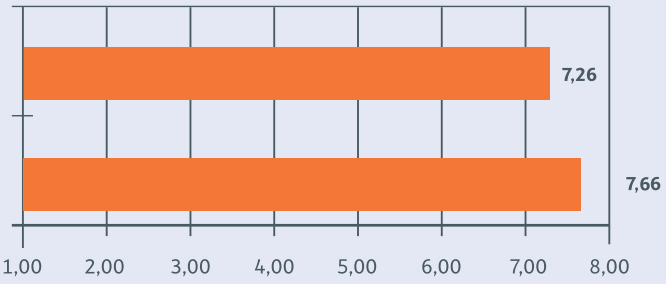


Chart 6. Economic benefits of energy facilities and renewable energy (means, scale 1-10)

Information about renewable energies and energy facilities

Seven out of ten respondents feel that there has available sufficient information on energy efficient buildings and renewable energy installations.

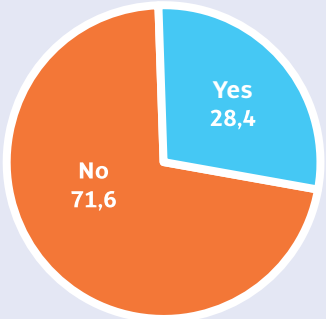


Chart 7. Information on energy efficient buildings and renewable energy facilities (%)

Thermal comfort vs. cost

Half the people are satisfied with the relationship between thermal comfort of your home and what you spend on energy; it is noteworthy that only 2.2% are fully satisfied compared with 12.5 who are not at all satisfied with this aspect of your home.

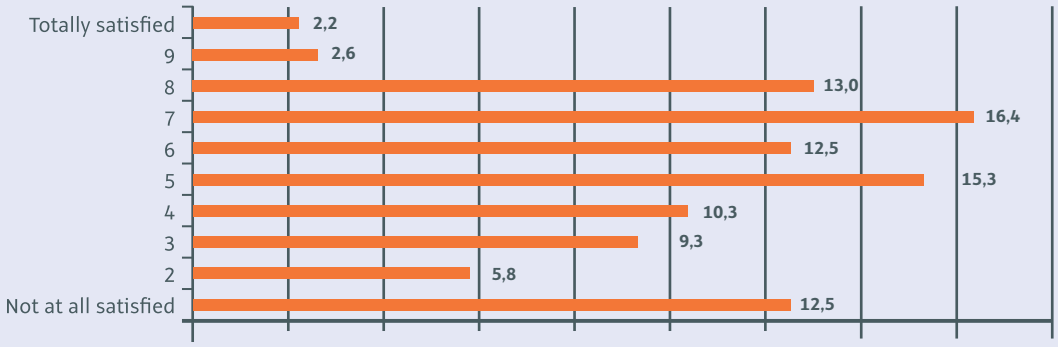


Chart 8. Are you satisfied with the relationship between thermal comfort of your home and what you spend on energy? (%)

Investment in energy efficiency

Half of the respondents would be willing to invest in improving the energy efficiency of your home, three out of ten base their decision on the availability of information and only one in ten is not willing to make the investment.

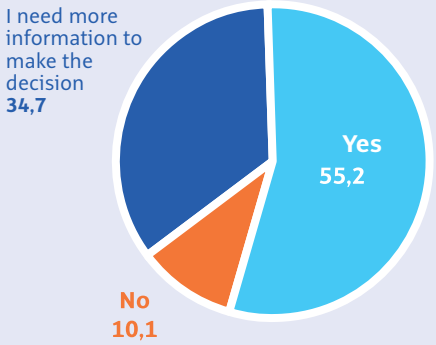


Chart 9. Would you be willing to invest in improving the energy efficiency of your home? (%)

Type of housing

Seven out of ten respondents living in homes located in buildings. And the same proportions live in households of more than 11 years.

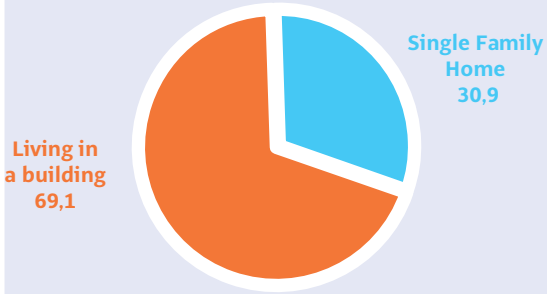


Chart 10. In what kind of housing do you live? (%)

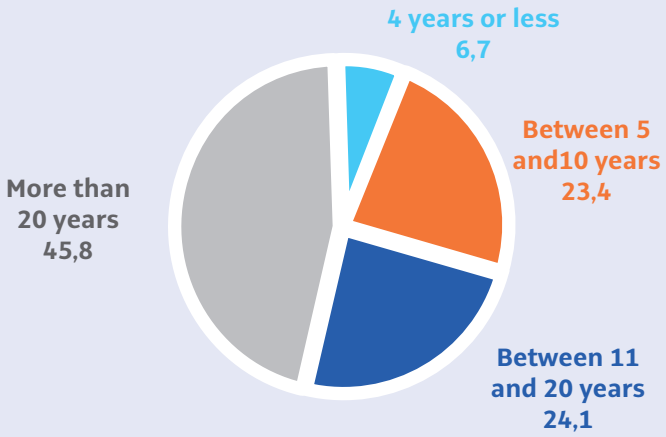


Chart 11. How many years ago was the current house built? (%)

Only 20.6% plan to move home in the next three years.

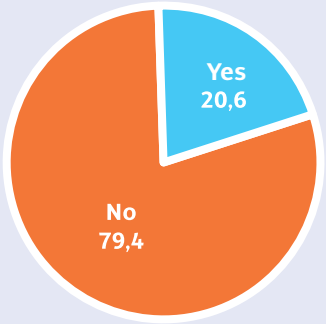


Chart 12. Do you have plans move house in the next three years? (%)

With respect to age, we can see that young people up to 34 years are willing to invest in improving the energy efficiency of your home, the tendency to invest decreases with advancing age, but after 65 years the trend changes. The willingness to move house in the next three years repeating the same pattern of decreasing percentage distribution.

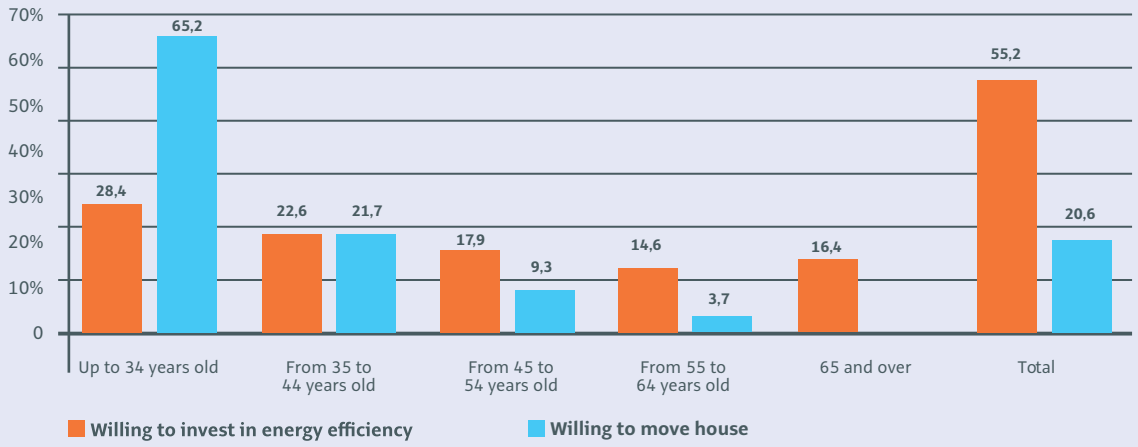


Chart 13. Willingness to change to invest in energy efficiency and housing change by Age (%). (%)

Sector w orkers have represented five out of ten respondents.

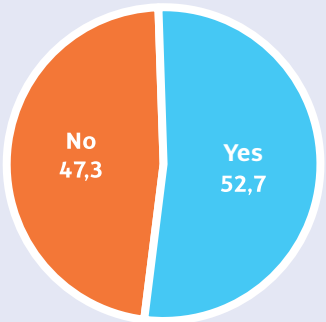


Chart 14. Do you perform your work in any activity related to the construction sector? (%)

The data shows that the information available to people can make the difference between whether or not to invest in improving the energy efficiency of their home, so those who know the amount of the costs they involve the payment of energy, water and lighting are more willing to invest or move house. Similarly, those who know the benefits of energy efficient buildings are also more willing to invest their money on improving their home or change their address, although the latter to a lesser extent. The above is interesting because seven out of ten respondents said they **did not have sufficient information** on the issues of renewable energy and energy efficiency.

Actions and proposed recommendations for the roadmap	
Actions	
R1 R2 R16	27. Outreach campaigns aimed at informing about the different solutions available on EE and RES.
R5 R7 R16	28. Outreach campaigns aimed at changing attitudes and awareness.
R8 R9 R10	29. Knowledge of the applications of RES and its benefits by owners and users. Energy calculation simulator.
Recomendations	
R2 R11	10. Basis of a new system of grants based on the implementation of RES systems in buildings.
R2 R6 R11	11. Instituting policy changes that encourage demand.

4. Actions Proposed for the Roadmap, Recommendations and Action Plan

4.1. Proposed Actions

Each of the actions proposed to be part of the roadmap, has been described in a tab that contains all the elements necessary for further development and implementation. Thus, the sections that make up each tab are:

- *Area that it develops:* in this section we indicate which of the priority areas identified in the BUILD UP SKILLS SPAIN platform deals with the action in question.

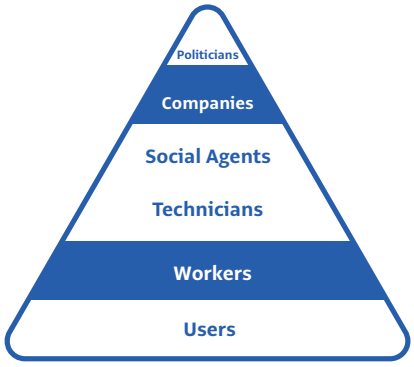
Description of the barrier: here we identify which of the barriers detected in the status quo report the proposed action seeks to palliate.

- *National objectives:* in this element the national specific objective to which the measure contributes to its achievement, is described.
- *Description of the action:* a brief explanation of the proposed action.
- *Action items:* detailed description of the different factors, components, elements, etc., that form the basis of the proposed measure.
- *Level of impact:* pyramid chart indicating at which level or levels the action would affect mostly. Six levels of incidence or impact are considered:

Political Level / Social Agents' Level / Business Level / Technical Level/ Worker's Level / User's Level.

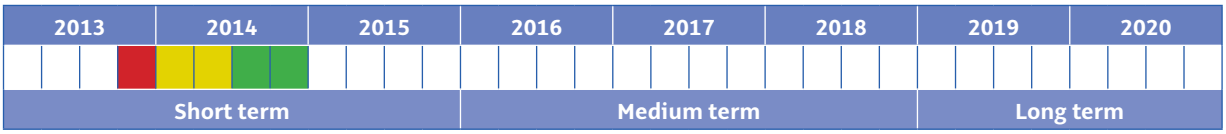
- *Implicated/recipients:* identification of those involved in the development and / or implementation of the proposed action as well as the recipients and / or final beneficiaries thereof.
- *Action plan:* timing in the period of the proposed measure between 2013 - 2020, identifying its planned quarter startup in key colours (RED), period considered for execution or development (YELLOW) and estimated time of effective implementation (GREEN).
- *Required resources:* description of the human and material resources needed for an effective development and implementation of the proposed action.
- *Financing:* identification of potential public or private mechanisms for financing the measure as well as the estimated cost thereof.
- *Feasibility analysis:* this section displays a radial chart to assess the feasibility of the proposed action on the basis of four key factors:
    - Probability of implementation of the action, that is, how likely it is that the proposed action finally ends up developed and implanted considering the current and future situation. A greater percentage in the graph, a higher chance of implantation.
    - Relevance of the same to achieve the 20-20-20 targets, i.e., what is the importance of the proposed action to achieve them. A higher percentage, a greater relevance in the graph.
    - Facility of development and implementation of the action, i.e., how easy or difficult is the implementation of the action from a technical point of view. A higher percentage in the graph, greater ease of implementation.
    - Assessment of the cost estimated low, medium or high compared to the rest of the measures.
- *Other information of interest:* other types of relevant information appear in this section to understand the proposed action.

Action 1	
Area that it develops	**Description of the barrier**
Profitability	**Structural barriers of the sector:** Traditionalism of the sector.
National objectives	
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it. Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.	
Description of the action	**Action items**
Training action on the economic parametres that determine the profitability of the actions in energy efficiency in buildings.	Set, in the training programs of the courses related to EE and RES a specific content that explains: - Concepts of initial investment - Cost of Energy - Maintenance costs - Payback time - Internalize the need for economically profitable activities that may involve an extra cost on the traditional way of proceeding. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.
Level of impact	**Recipients / implicated**



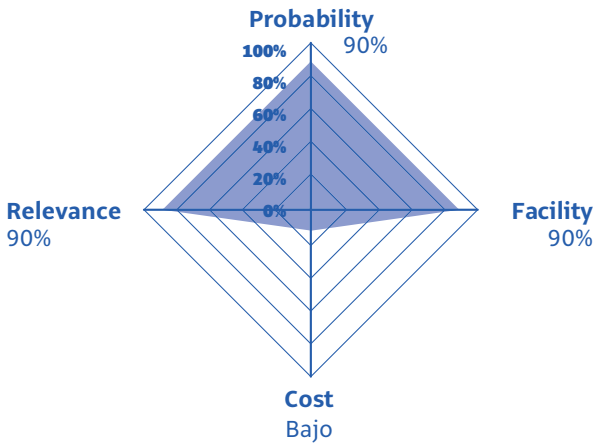
Recipients	Implicated
Construction workers SMEs Trainers	Social agents Foundations Training centers Ministry of Education Ministry of Labour

Action plan



Required resources	Financing	
Profitability energy expert advisors. Advisory training experts. Experts in developing teaching materials.	Mechanisms	**Public:** grants from various European and national programs
	Estimated cost	**Design and microprogramming of the training:** a technician working for a month = 1.500€ **Teaching material:** development, review and layout = 6.000€ **Pilot courses =** 15 students x 60 hours x 13€ = 11.700€ **TOTAL:** 19.200€

feasibility analysis

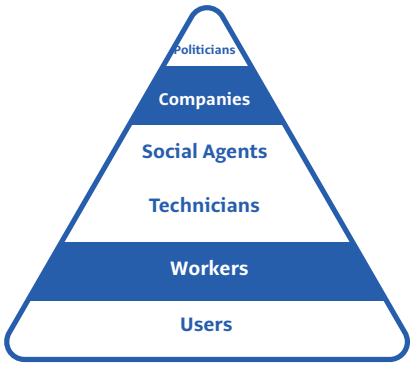


Other information of interest

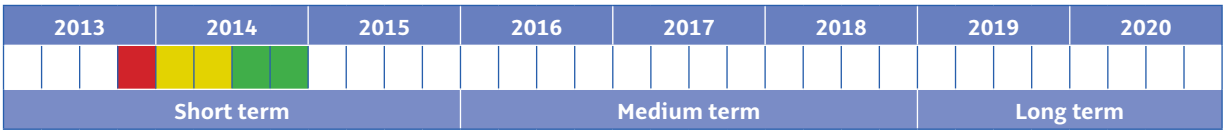
The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€

With this action it is estimated to be approximately 6% of the workers from NCEA:

- 41.21 Construction of residential buildings
- 41.22 Construction of non-residential buildings
- 43.21 Electrical installations
- 43.22 Plumbing, heating systems and air conditioning installations
- 43.32 Carpentry installation
- 43.34 Painting and glazing
- 43.39 Other building completion
- 43.91 Roofing

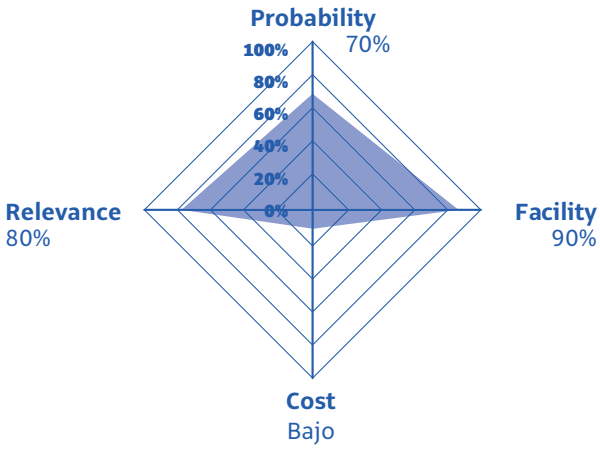
Action 2		
Area that it develops	**Description of the barrier**	
Profitability	**Structural barriers of the sector:** responsibility of the Builders and Developers.	
National objectives		
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it.		
Description of the action	**Action items**	
Training action on the impact on consumption and energy turnover that occurs when tasks are executed correctly in building.	The objective of this action is to design a training course that aims to present the elements that influence the energy efficiency of a building, as required by the Technical Building Code and the regulations in force, in order that those responsible for the work and first class officials who can monitor and transmit the good practices implementation of these elements to the workers under them: - Comparative energy and economic, quantifiable, including the execution of a certain task with energy efficiency criteria and without looking at them. - The need to properly execute the work entailing an economic saving in the use phase of the building or facility. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Construction workers. Managers and top officials. SMEs in the construction sector.	State Public Employment Service. Tripartite Foundation for Employment Training. Construction Labour Foundation. Building Constructions.

Action plan



Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** a technician working for a month = 1.500€ **Teaching material:** development, review and layout = 6.000€ **Pilot courses =** 15 students x 60 hours x 13€ = 11.700€ **TOTAL:** 19.200€

Feasibility analysis



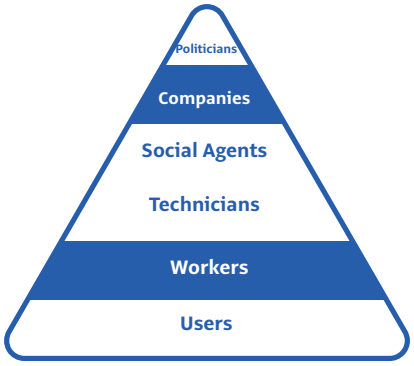
Other information of interest

The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€

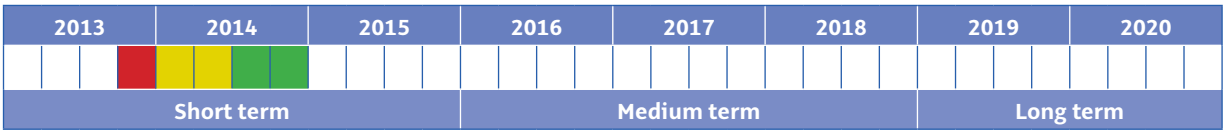
With this action it is estimated to be approximately 10% of the workers from NCEA:

41.21 Construction of residential buildings

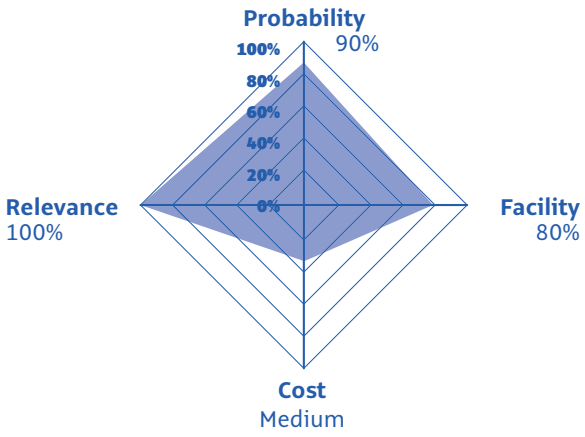
41.22 Construction of non-residential buildings

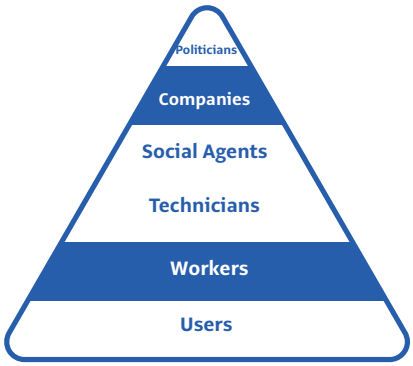
Acción 3		
Area that it develops	**Description of the barrier**	
Building with EE criteria	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it.		
Description of the action	**Action items**	
Planning an itinerary for Employment Training: "Placing indoor and outdoor insulation and sealing according to CTE for construction workers.	The objective of this action is to design a training itinerary that aims to raise awareness of the different positioning systems of indoor and outdoor insulation and sealing joints, as required by the Technical Building Code, to the construction workers. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Operators, bricklayers, assemblers of laminated plasterboard, floating floor, etc.., of construction works	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Manufacturers of building materials

Action plan

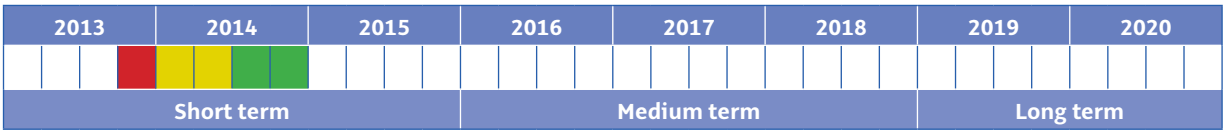


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 55.000€

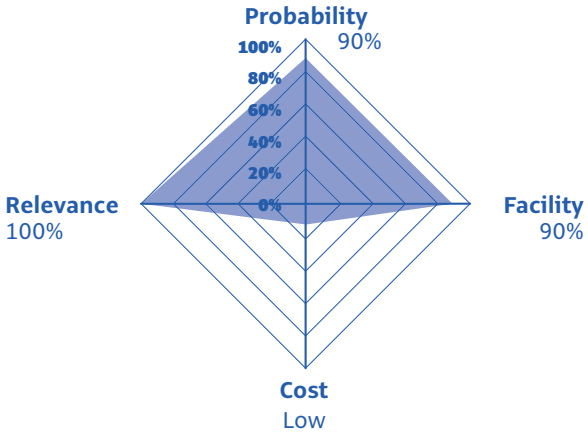
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 30% of the workers from NCEA: 41.21 Construction of residential buildings 41.22 Construction of non-residential buildings 43.91 Roofing

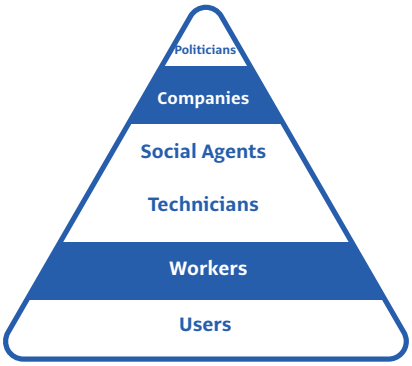
Action 4		
Area that it develops	**Description of the barrier**	
Building with EE criteria	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it.		
Description of the action	**Action items**	
Designing an action for employment training for fitters in energy efficient enclosures of hollow façade with aluminum and PVC metalwork.	The objective of this action is to design a training course that aims to teach the proper installation of energy efficient enclosures of hollow façade with aluminum and PVC metalwork to construction workers. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Aluminum and PVC metalwork assemblers. Building sector SMEs.	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Manufacturers of building materials

Action plan

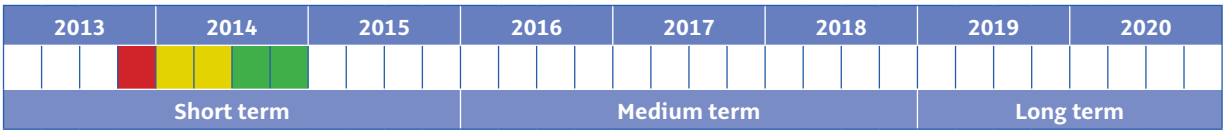


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** a technician working for a month= 1.500€ **Teaching material:** development, review and layout = 6.000€ **Pilot courses =** 15 students x 60 hours x 13€ = 11.700€ **TOTAL:** 19.200€

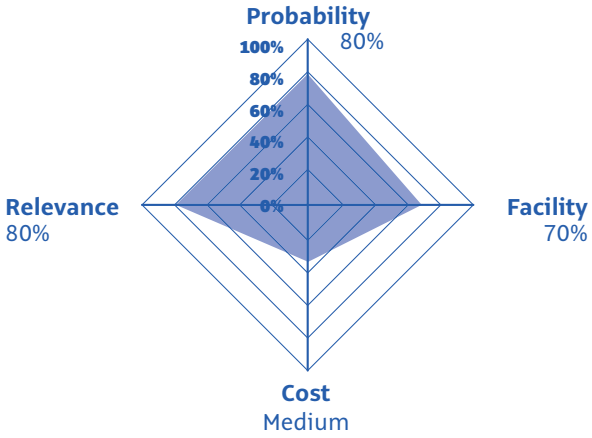
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 40% of the workers from NCEA: 43.32 Carpentry installation 43.34 Painting and glazing

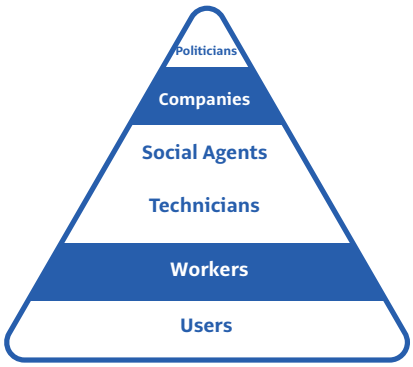
Action 5		
Area that it develops	**Description of the barrier**	
Building with EE criteria	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Design a training pathway for the employment "Installation and maintenance of highly efficient heating and hot and cold systems for installers.	The objective of this action is to design a training itinerary that aims to raise awareness of the different installation and maintenance of highly efficient heating and hot and cold systems to the Building installers work. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Installers. Building sector SMEs.	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation

Action plan

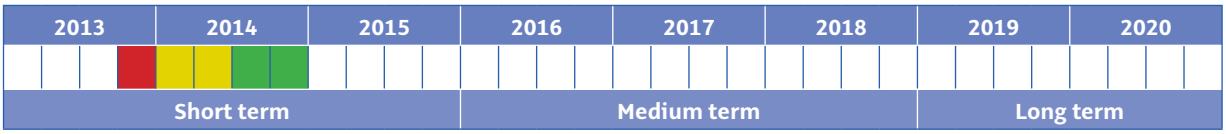


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 55.000€

Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€. With this action it is estimated to be approximately 30% of the workers from NCEA: 43.22 Plumbing, heating systems and air conditioning installations.

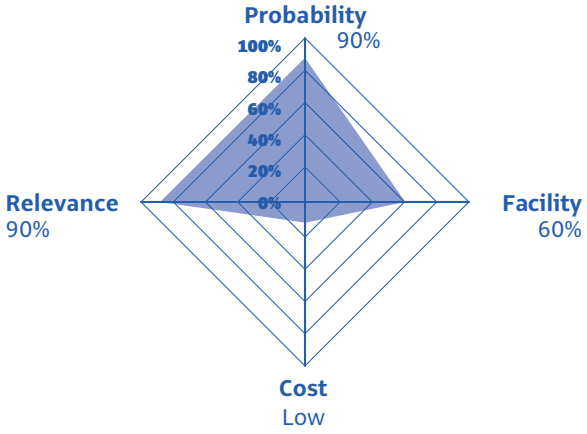
Action 6		
Area that it develops	**Description of the barrier**	
Building with EE criteria	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it. Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Designing a training action for employment: "Energy efficiency in buildings".	The objective of this action is to design a training course that aims to raise awareness of the elements contributing to the energy efficiency of a building and the requirements concerning their implementation, regulated by mandatory legislation at national level, to the workers from the construction sites. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Workers and operators of the building sector Companies in the construction sector.	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation

Action plan



Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** a technician working for a month = 1.500€ **Teaching material:** development, review and layout = 6.000€ **Pilot courses =** 15 students x 60 hours x 13€ = 11.700€ **TOTAL:** 19.200€

Feasibility analysis

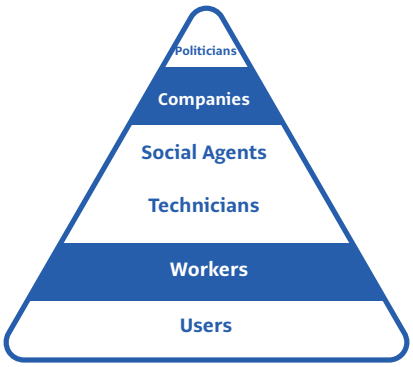


Other information of interest

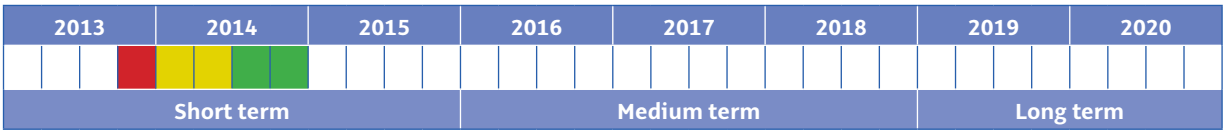
The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€

With this action it is estimated to be approximately 70% of the workers from NCEA:

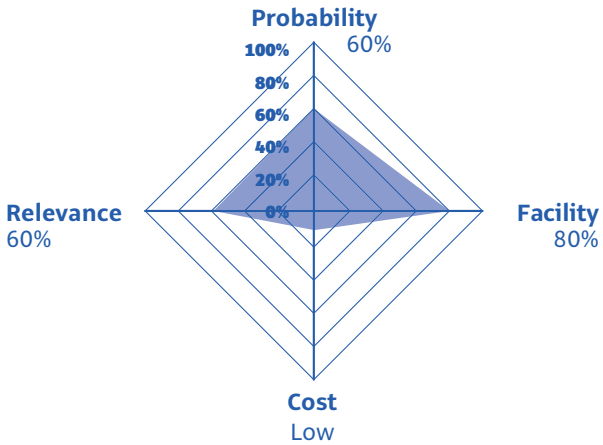
- 41.21 Construction of residential buildings
- 41.22 Construction of non-residential buildings
- 43.32 Carpentry installation
- 43.34 Painting and glazing
- 43.91 Roofing

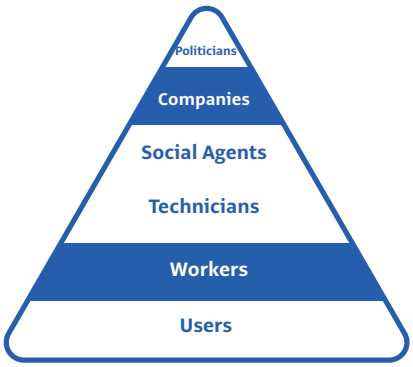
Action 7		
Area that it develops	**Description of the barrier**	
Building with EE criteria	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the existing indoor lighting installations.		
Description of the action	**Action items**	
Designing a training action for employment: Installation of lighting systems for installers according to CTE.	The objective of this action is to design a training course that aims to raise awareness to the different efficient lighting systems as required by the Technical Building Code for installers. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Electricians. Companies in the construction sector.	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Material companies

Action plan

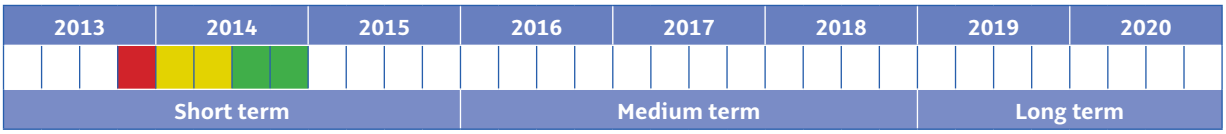


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public**: grants from various European and national programs
	Estimated cost	**Design and microprogramming of the training:** a technician working for a month = 1.500€ **Teaching material:** development, review and layout = 6.000€ **Pilot courses =** 15 students x 60 hours x 13€ = 11.700€ **TOTAL:** 19.200€

Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to train about half of the workers who were estimated in Tab Nº 6 of installation and maintenance of highly efficient heating and hot and cold water systems for installers (authorized installer for ACS system and air conditioning, plumber).

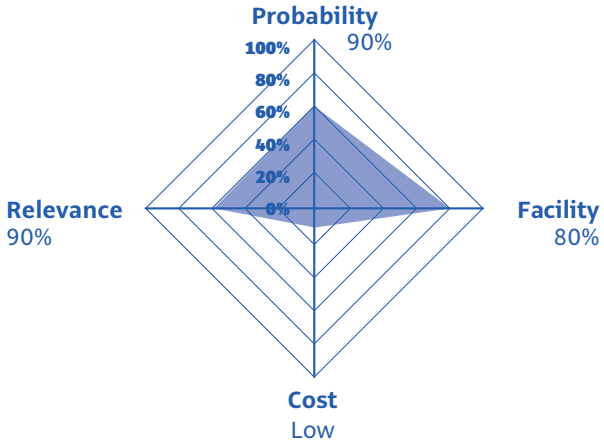
Action 8		
Area that it develops	**Description of the barrier**	
Installations of renewable energy systems.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero.		
Description of the action	**action items**	
Designing a training action for employment: "The renewable energy systems in buildings".	The objective of this action is to design a training course that aims to raise awareness to the different renewable energy catchment systems with application in the building sector such as wind, solar thermal, photovoltaic, biomass or geothermic. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Building installers Companies in the construction sector	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Building Constructions

Action plan



Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** a technician working for a month = 1.500€ **Teaching material:** development, review and layout = 6.000€ **Pilot courses =** 15 students x 60 hours x 13€ = 11.700€ **TOTAL:** 19.200€

Feasibility analysis



Other information of interest

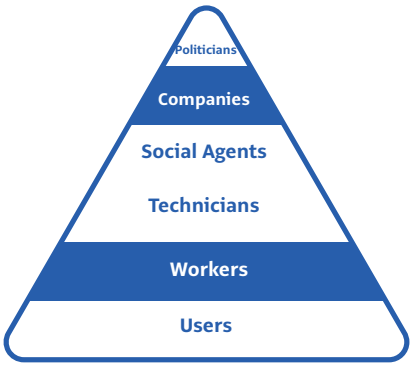
The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€

With this action it is estimated to be approximately 10% of the workers from NCEA:

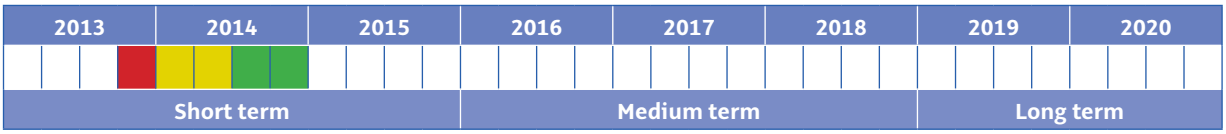
41.21 Construction of residential buildings

41.22 Construction of non-residential buildings

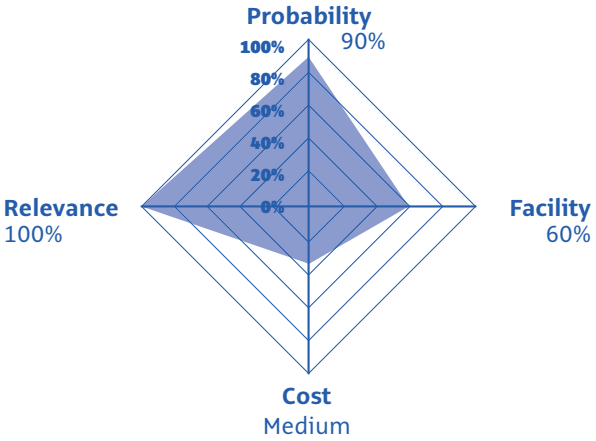
43.22 Plumbing, heating systems and air conditioning installations

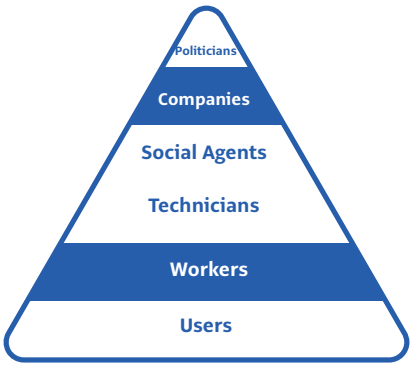
Action 9		
Area that it develops	**Description of the barrier**	
Installations of renewable energy systems.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Design a training schedule for employment: "Installation and maintenance of heat generation systems through geothermal energy".	The objective of this action is to design a training schedule that aims to train students in the assembly and maintenance of heat generation systems by harnessing geothermal energy. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Building installers Companies in the construction sector	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Building Constructions

Action plan

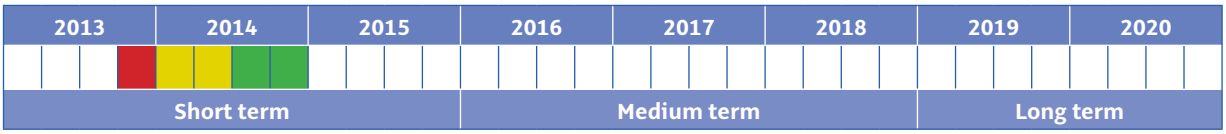


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 55.000€

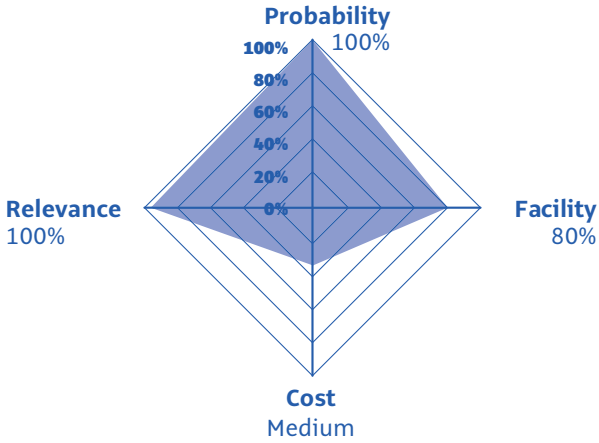
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 10% of the workers from NCEA: 41.21 Construction of residential buildings 41.22 Construction of non-residential buildings 43.22 Plumbing, heating systems and air conditioning installations

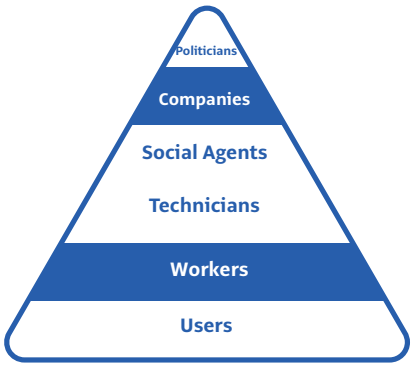
Action 10		
Area that it develops	**Description of the barrier**	
Installations of renewable energy systems.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Design a training schedule for employment: "Assembly and maintenance of heat generation systems using biomass combustion".	The objective of this action is to design a training schedule that aims to train students in the assembly and maintenance of heat generation systems using biomass combustion. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Building installers Companies in the construction sector	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Building Constructions

Action plan

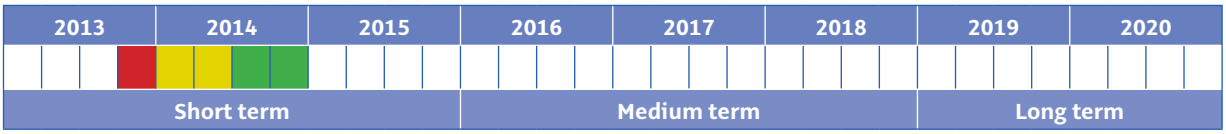


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 55.000€

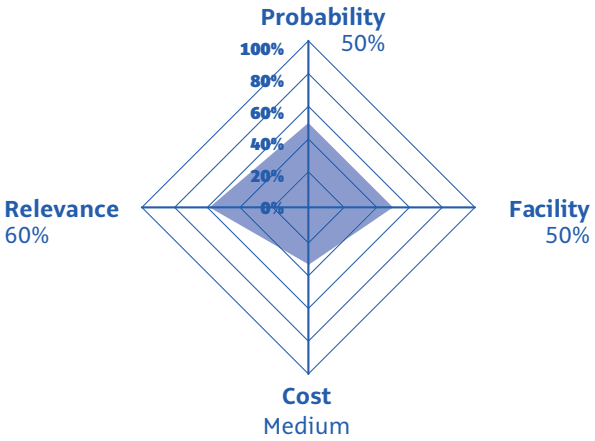
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 20% of the workers from NCEA: 43.22 Plumbing, heating systems and air conditioning installations.

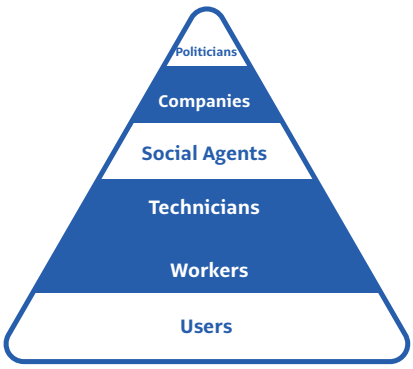
Action 11		
Area that it develops	**Description of the barrier**	
Installations of renewable energy systems.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Design a training schedule for employment: "Assembly and maintenance of aerothermal and solar thermodynamic facilities for building."	The objective of this action is to design a training schedule that aims to train the students in the assembly and maintenance of aerothermal and solar thermodynamic facilities for building. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Building installers Companies in the construction sector	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Building Constructions

Action plan

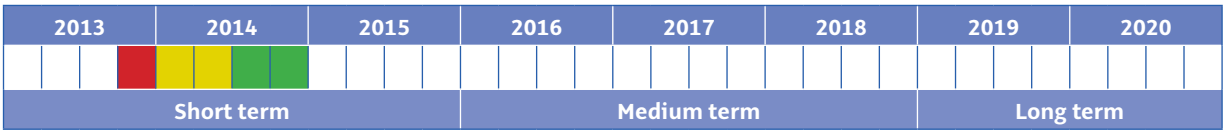


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs.
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 55.000€

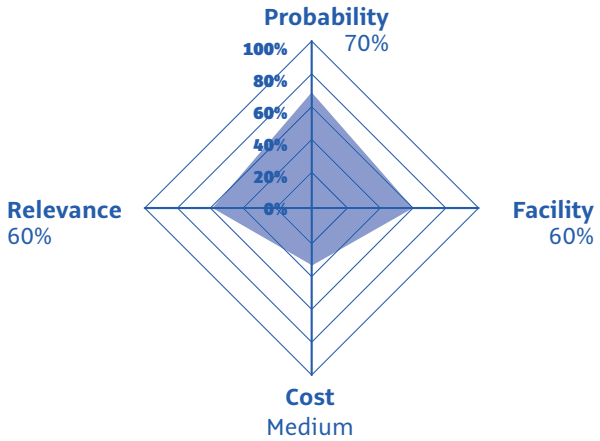
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 10% of the workers from NCEA: 43.22 Plumbing, heating systems and air conditioning installations

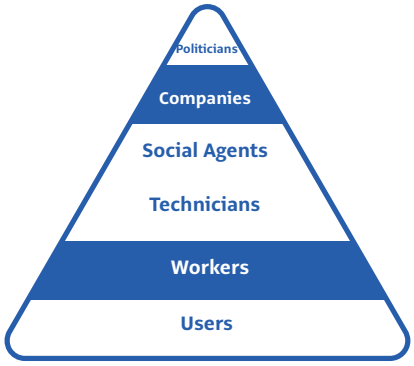
Action 12		
Area that it develops	**Description of the barrier**	
Installations of renewable energy systems.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Design a training schedule: "Energy management of building facilities".	The objective of this action is to design a training schedule that aims to train the students in the management from the energy point of view of building installations. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Building installers Technicians Companies in the construction sector	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Energy management companies

Action plan

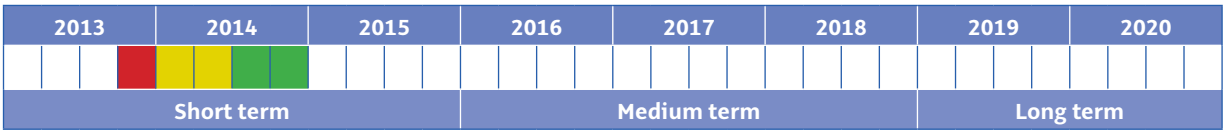


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 55.000€

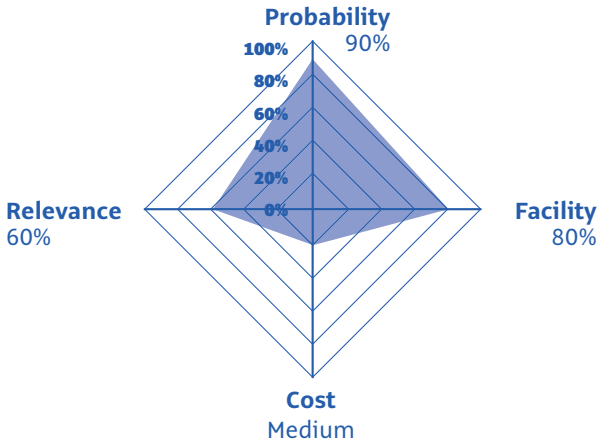
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 30% of the workers from NCEA: 43.22 Plumbing, heating systems and air conditioning installations

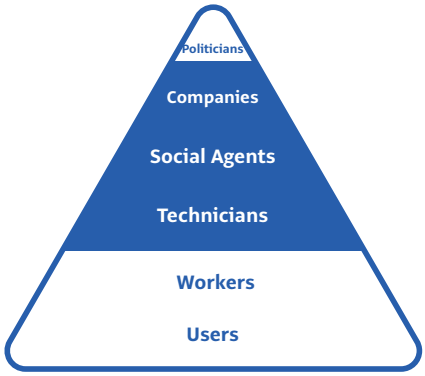
Action 13		
Area that it develops	**Description of the barrier**	
Installations of renewable energy systems.	**Educational and cultural barriers: initial low qualification workers.**	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Designing a training action for employment: "Assembly and maintenance of high performance heat pumps."	The objective of this action is to design a training schedule that aims to train the students in the assembly and maintenance of high performance heat pumps. The action would have three elements: - Design of the course: definition of the recipients of the action, design of learning objectives and contents, planning the training action and testing system and learning assessment. - Design teaching materials for the provision of the actions aimed at students and teachers. - Implementation of the training: completion of a pilot experience of training to test the designed course with real recipients, with the aim of identifying any areas for improvement.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Building installers Companies in the construction sector	State Public Employment Service Tripartite Foundation for Employment Training Construction Labour Foundation Building Constructions

Action plan

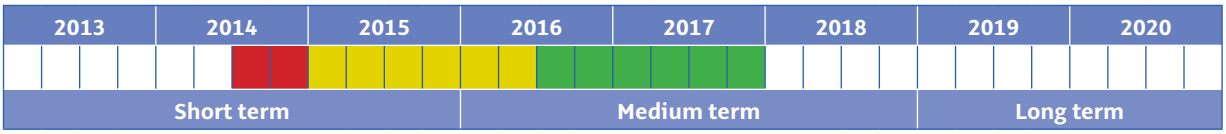


Required resources	Financing	
Training technicians for the design of the action Experts in the development of teaching materials Layout artists Training Coordinator Trainer	Mechanisms	**Public:** grants from various European and national programs
	Estimated cost	**Design and microprogramming of the training:** two technicians working for two months = 6.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 100 hours x 13€ = 19.500€ **TOTAL:** 35.500€

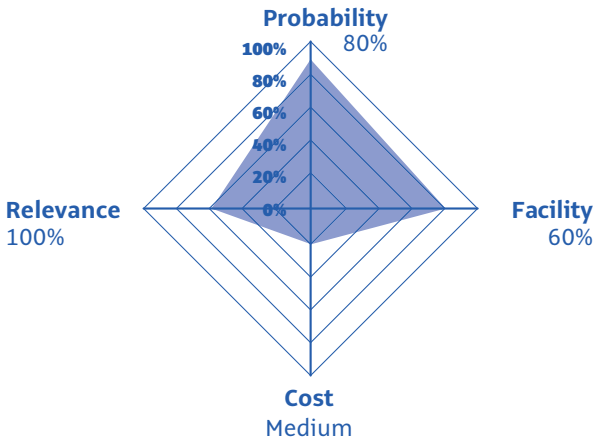
Feasibility analysis	Other information of interest
	The total investment in training in EE and RES from 2013 to 2020 = 225.081.592€ to 481.998.136€ With this action it is estimated to be approximately 30% of the workers from NCEA: 43.22 Plumbing, heating systems and air conditioning installations

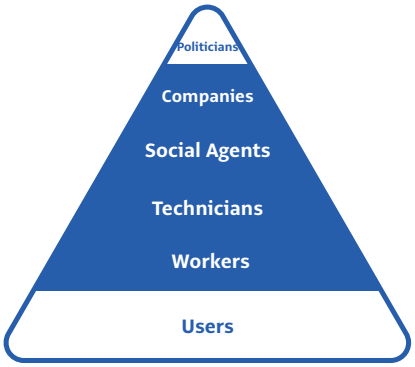
Action 14		
Area that it develops	**Description of the barrier**	
Professional qualifications.	**Administrative barriers:** Reduced information.	
National objectives		
Transversal to all the targets.		
Description of the action	**Action items**	
Monitoring and development network of the professional skills required by the productive system at the national and EU level.	- Enhancing communication procedures between the observatories and professional information points of all the administrations and the various bodies and agents involved. - Maintenance of stable working groups for monitoring and the development of professional skills identified in the CNCP. - Consolidation of the participation procedures of different public administrations and social agents.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Public Administrations. Entrepreneurs. Social agents. Counselors. Professionals.	Educational administration. Labour administration. Other public administrations. Social agents. EU bodies dedicated to the PT.

Action plan

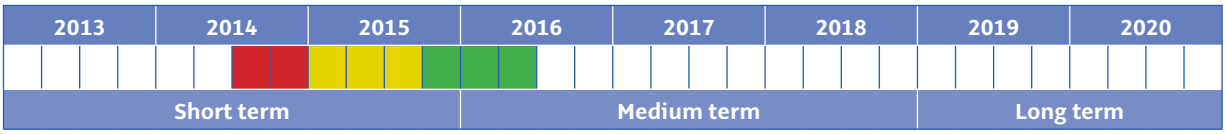


Required resources	Financing	
Qualified personnel in analysis and market developments. Qualified personnel to coordinate joint actions to be developed in the SNCFP field. Qualified technical personnel to identify, design and keep the CNCP and support tools. IT support collection and treatment of information of a scalable nature.	**Mechanisms**	Joint funding from different administrations and entities that would intervene. European subsidies.
	Estimated cost	The implementation of the network and its pilot implementation would cost an estimated 50.000€.

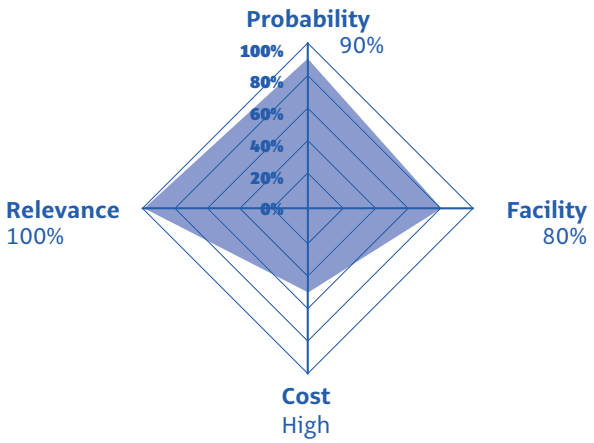
Feasibility analysis	Other information of interest
	

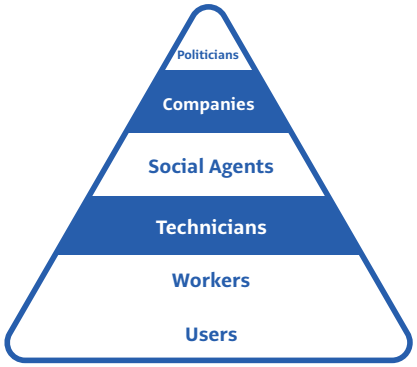
Action 15		
Area that it develops	**Description of the barrier**	
Professional qualifications.	**Administrative barriers:** Reduced information.	
National objectives		
Transversal to all the targets.		
Description of the action	**Action items**	
Integrated platform of information and professional guidance of the National System of Professional Qualifications and Professional Training area.	- Make it easier for users to identify their professional skills. - Updated and integrated exhibition of different training offers and its different implementation methods in the productive system. - Continuous updating of information on the open procedures for the recognition, evaluation and accreditation of professional competences. - Information and personalized guidance on the different training and professional schedules of a general and specific nature. - Viewing the gateways between the training subsystems and its accesses. - Incorporate information to promote the mobility of the workers in the European and International levels. - Facilitate the user's access to a personalized professional guidance to facilitate the search and job retention and the professional development. - Facilitate the integration of the information and professional guidance network resource in the state, regional and local areas.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Professionals. Entrepreneurs and Managers of Economic Activities. Educational agents. Professional Counselors. Students. Workers.	Educational administration. Labour administration. Autonomous Communities. City Councils and other public administrations.

Action plan

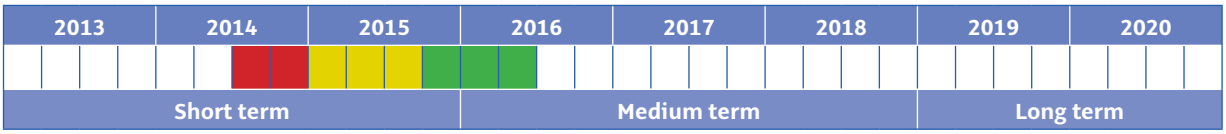


Required resources	Financing	
Qualified technical personnel to design, implement and maintain the INTEGRATED PLATFORM. IT support of a scalable nature. Qualified technical personnel to look for, select and update contents.	Mechanisms	Joint funding from different administrations and entities that would intervene. European subsidies.
	Estimated cost	The commissioning of the platform and its pilot implementation would cost an estimated 80.000€.

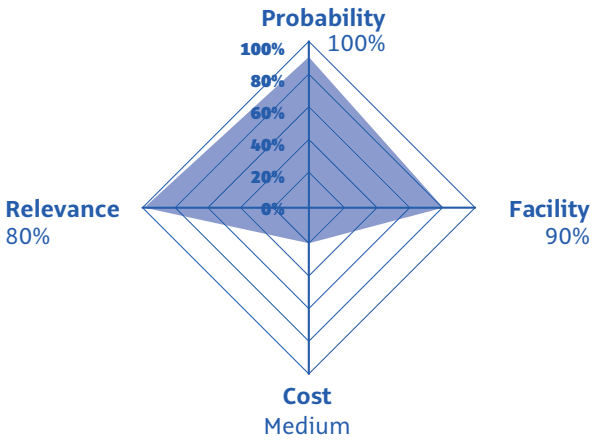
Feasibility analysis	Other information of interest
	

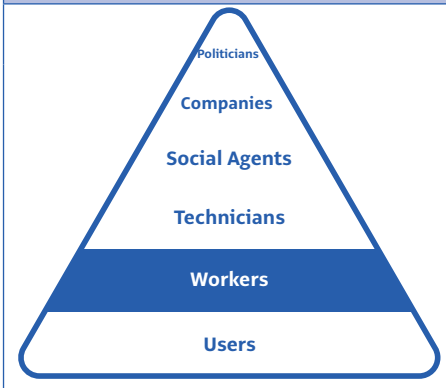
Action 16		
Area that it develops	**Description of the barrier**	
Professional qualifications.	**Structural barriers of the sector:** Traditionalism of the sector.	
National objectives		
Transversal to all the targets.		
Description of the action	**Action items**	
Quality assessment of SNCFP.	Establishment of a working group that integrates those responsible for the coordination of the SNCFP in the EE and RES areas. Definition of a methodology for measuring and evaluating the SNCFP. Planning and implementing the developed methodology. Assessment of the professional and training references in the EE and RES areas.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Training and accreditation entities.	Educational administration. Labour administration. Autonomous Communities. Social agents.

Action plan

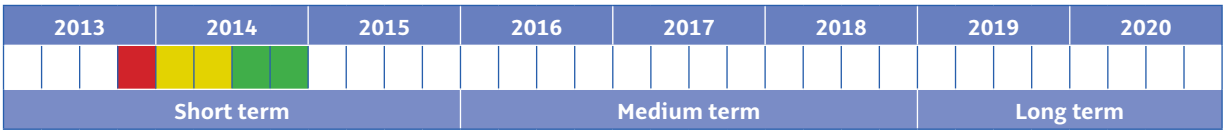


Required resources	Financing	
Technical staff of the institutions involved. Hired outsourced technicians, experts in training systems quality.	Mechanisms	Joint funding from different administrations and entities that would intervene. European subsidies.
	Estimated cost	The commissioning of the working group, its pilot implementation and associated resources would cost an estimated 30.000€.

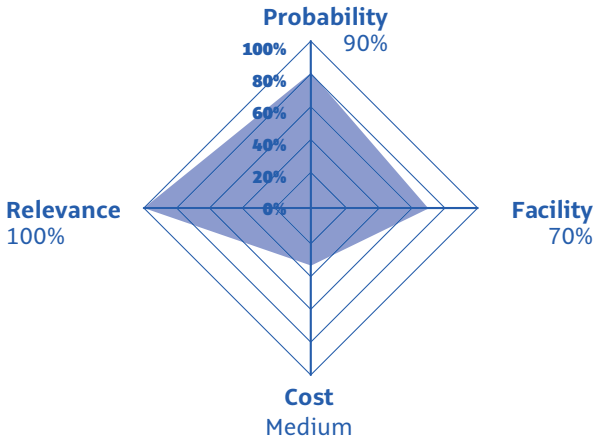
Feasibility analysis	Other information of interest
	

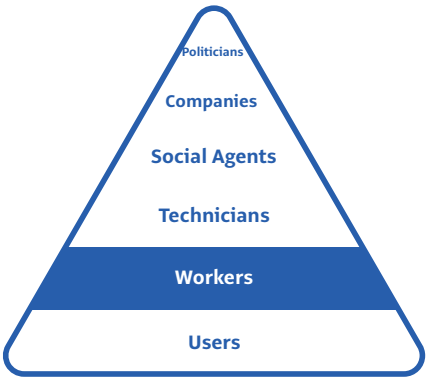
Action 17		
Area that it develops	**Description of the barrier**	
Professional qualifications.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it. Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Revision of existing qualifications in the building area related to EE and RES.	- Revision of the professional qualifications of those professional families related to EE and RES - Definition together with external experts of the associated professional competencies. - Decision on the inclusion of these competencies and contents in existing qualifications or developing a new one. - Design of the identified competencies according to the methodology established by the INCUAL. - Development of the training contents associated with the defined competencies. - Design of the support instruments.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Workers of the building sector.	Educational administration. Labour administration. Social agents. Technicians of the productive and training systems.

Action plan

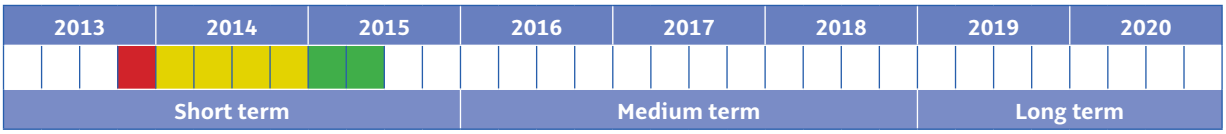


Required resources	Financing	
Technicians from the Ministry of Education Technicians from the Ministry of Labour External experts	Mechanisms	Joint funding from different administrations and entities that would intervene. European subsidies.
	Estimated cost	The commissioning of the working group would cost an estimated 49.500€.

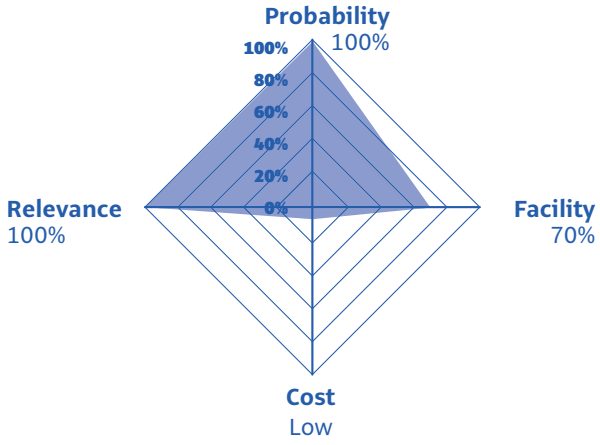
Feasibility analysis	Other information of interest
	

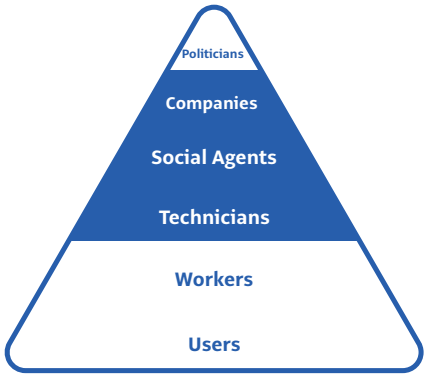
Action 18		
Area that it develops	**Description of the barrier**	
Professional qualifications.	**Educational and cultural barriers:** initial low qualification workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Development of professional skills and associated certifiable training of assembly and maintenance of heating systems by harnessing geothermal energy.	- Definition together with external experts of the associated professional competencies. - Decision on the inclusion of these competencies and contents in existing qualifications or developing a new one. - Design of the identified competencies according to the methodology established by the INCUAL. - Development of the training contents associated with the defined competencies. - Design of the support instruments.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Construction workers, especially those related to EE and RES.	Educational administration. Labour administration. Social agents. Technicians of the productive and training systems.

Action plan

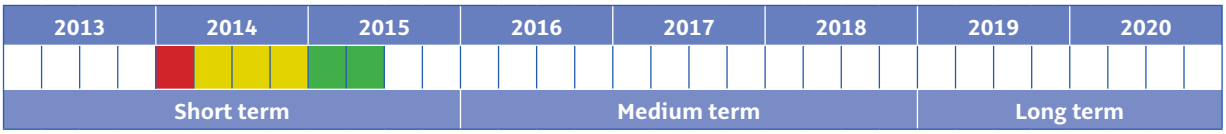


Required resources	Financing	
Technicians from the Ministry of Education Technicians from the Ministry of Labour External experts	Mechanisms	Joint funding from different administrations and entities that would intervene. European subsidies.
	Estimated cost	The development of the work envisaged in this action would cost an estimated 15.000€.

Feasibility analysis	Other information of interest
	

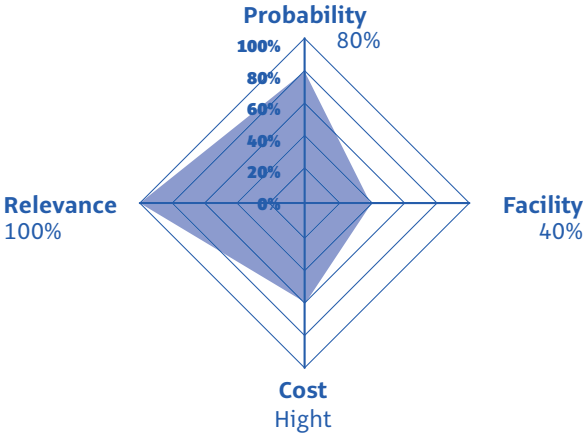
Action 19		
Area that it develops	**Description of the barrier**	
Training for Employment.	**Administrative barriers:** access difficulty of the SMEs to training.	
National objectives		
Transversal to all the targets.		
Description of the action	**Action items**	
Observatory for prospecting the employment and skills in the EE and RE fields.	The main objective of this action is to anticipate the behavior of the EE and RES activities from: - Observing the evolution of the trades and employment - Studying the employment / training relation - Producing and gathering the data that allow to anticipate the needs in skills and in training - Observing trends, alternative scenarios and viables The key elements to achieve this would be: - Analysis of construction activity indicators (NACE 41, 43) - Prospective analysis of occupations. Map of the trades and skills needed in relation to the activity. - Prospective analysis of employment - Training needs analysis - Permanent panel in companies: semiannual survey about activity, occupations and training. - Relevant information of the EE and RE sectors.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Training centers Construction companies Counseling services	Regional employment observatories Regional statistics institutes INE Professional colleges (architects, quantity surveyors) Ministry of Industry Ministry of Education Ministry of Employment Social Agents Construction Labour Foundation

Action plan



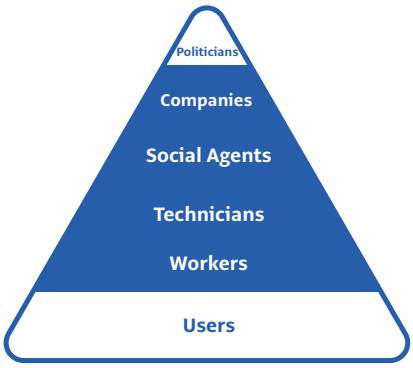
Required resources	Financing	
Technical staff training experts and studies of needs. Professionals of the sector. Representative sample of companies. Software support of survey management and data processing and analysis.	Mechanisms	**Public:** grants from various European and national programs **Private:** co-financing
	Estimated cost	**Business panel:** 50.000 **Indicators report:** 15.000 **Conclusions and biannual recommendations:** 15.000 **Diffusion:** 15.000 **Estimated annual cost =** 95.000€

Feasibility analysis

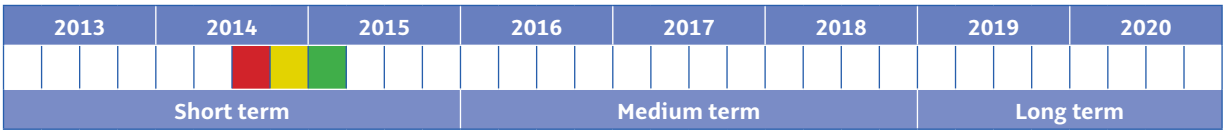


Other information of interest

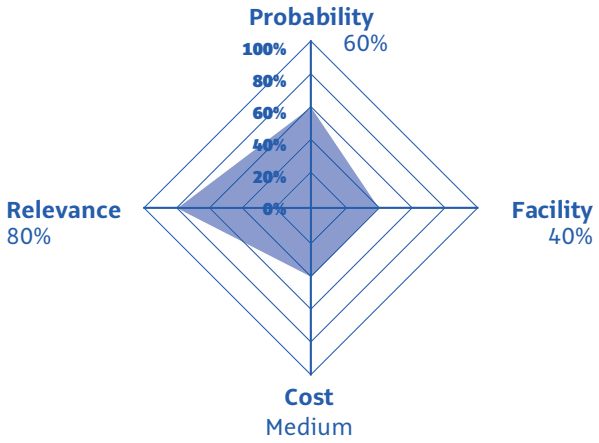
The methodology for the development of the observatory would be based on that developed for the implementation of the Industrial Building Observatory, which was coordinated by the Construction Labour Foundation, along with the participation of social agents, Ministry of Industry and industry representatives during 2009, 2010 and 2011, when funding was discontinued because of the economic crisis.

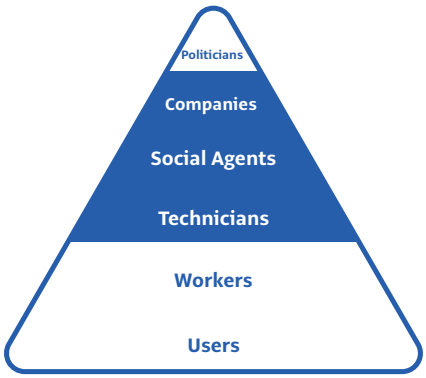
Action 20		
Area that it develops	**Description of the barrier**	
Training for Employment.	**Administrative barriers:** lack of guidance.	
National objectives		
Transversal to all the targets.		
Description of the action	**Action items**	
Thematic networks of experts from both the administration and private entities that, through ICT tools, can share information.	The aim of the networks of experts is to perform guidance work and information exchange to increase the efficiency of the intermediation between professionals and training offer in the EE and RE areas. The network members will be professionals who perform career guidance work, teachers, and administration technicians with skills in configuring the training offer. With the use of ICT tools, the experts will be able to share information regarding the competences required and training resources in the EE and RES areas.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Counselors Training centers Counseling Services Employed and unemployed workers.	Guidance services at national, regional and local levels Ministry of Education Ministry of Employment Social Agents Permanent training centers of the EOC professional family.

Action plan

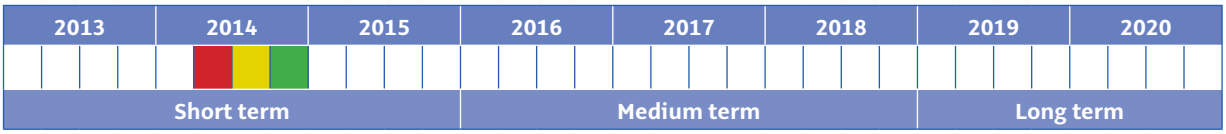


Required resources	Financing	
Technical staff training experts of the EE and RES sector and guidance experts. Facilitators of expert networks. ICT Tools.	Mechanisms	**Public:** grants from various European and national programs **Private:** co-financing
	Estimated cost	**ICT Tool:** 20.000€ **Incentives experts:** 10.000€ **Technical facilitators:** 15.000€ **Diffusion:** 15.000€ **Estimated annual cost =** 60.000€

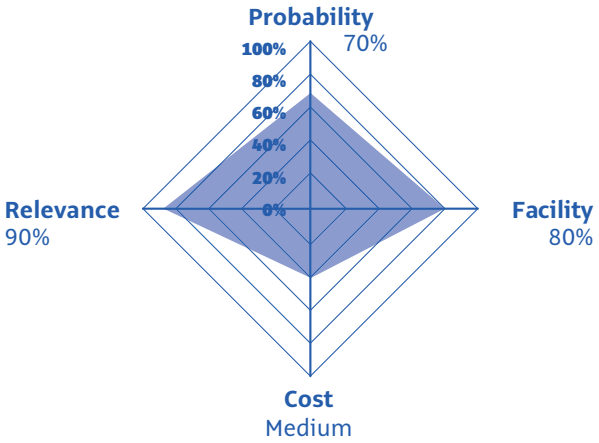
Feasibility analysis	Other information of interest
	

Action 21		
Area that it develops	**Description of the barrier**	
Training for Employment.	**Educational and cultural barriers:** motivation.	
National objectives		
Transversal to all the targets.		
Description of the action	**Action items**	
Designing a technical requalification schedule, retraining teachers in EE and RES.	The purpose of this schedule is to design the actions to be taken to upgrade and retrain the teachers, through technical training in EE and RES. It will take place through: - Detecting and defining the competencies of the trainers, in EE and in RES for building, - Selecting the technical areas, subjects and contents in which it is necessary to carry out the upgrade of the teachers. - Carrying out the selection and sequencing of the contents and learning outcomes. - Designing the methodological strategies for the implementation of the plan. - Designing and selecting the educational resources. - Establishing the evaluation system of the requalification plan of the trainers.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Training centers. Companies in the building sector. Trainers of the professional training system of the building area for employment.	Expert trainers in EE and RE. Ministry of Industry. Experts in training teachers. Experts in the use of ICT in education. Companies and training centers. Ministry of Labour. Ministry of Education.

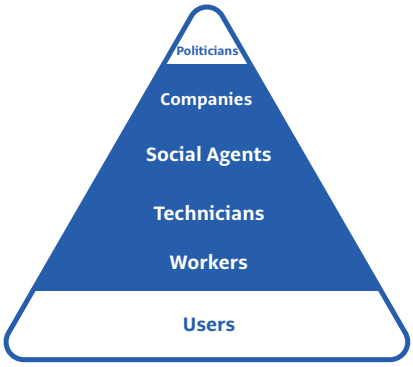
Action plan



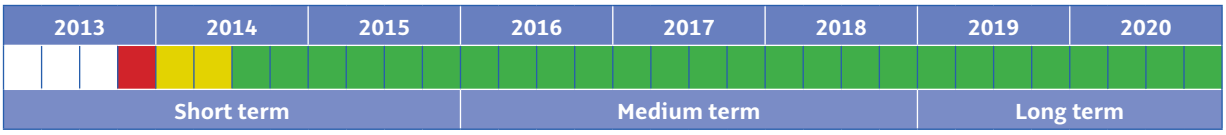
Required resources	Financing	
Experts in designing teacher training plans. Technical experts in design, planning and production of multimedia teaching resources. Technicians in the development of training contents.	Mechanisms	**Public:** grants from various European and national programs **Private:** co-financing
	Estimated cost	**Design and microprogramming of the training:** three technicians working for two months = 9.000€ **Teaching material:** development, review and layout = 10.000€ **Pilot courses =** 15 students x 200 hours x 13€ = 39.000€ **TOTAL:** 58.000€

Feasibility analysis	Other information of interest
	

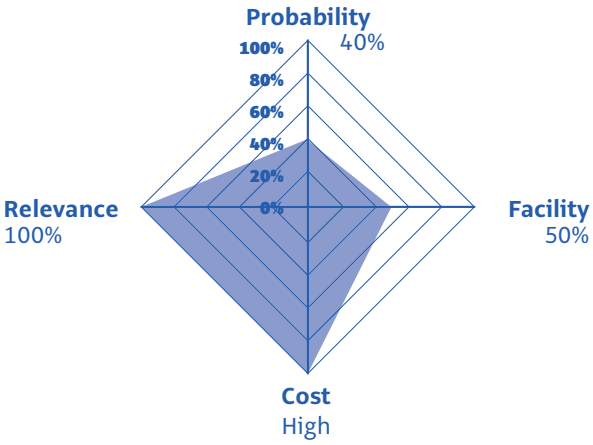
Action 22	
Area that it develops	**Description of the barrier**
Training for Employment.	**Educational and cultural barriers:** initial low qualification workers.
National objectives	
Transversal to all the targets.	
Description of the action	**Action items**
Global training plan "Construye 2020". Aimed at construction workers and trainers.	The plan's objective is to define the training plan to be carried out in the period 2014-2020, to upgrade and requalify workers more directly related to EE and RES. It will take place through: - Collecting and analyzing the information of the OBSERVATORY for prospecting the employment and skills in the EE and RE areas, prioritizing the competence needs to cover the "Construye 2020" plan. - Select the training actions to meet the prioritized needs. Among the actions to select in the "Construye 2020" plan will be the actions and schedules included in the roadmap: • A1. TA on profitable economic parametres in EE • A2. TA on the impact on the consumption and energy billing • A3. IT "Placement of indoor and outdoor insulation and sealing of joints according to CTE for construction operators" • A4. TA "Assemblers in EE hollow façade enclosures with aluminum and PVC metalwork." • A5. IT "Installation and maintenance of heating and highly efficient hot and cold water systems" • A6. TA "Energy efficiency in buildings" • A7. TA "Installation of lighting systems according to CTE" • A8. TA "The renewable energy systems in buildings" • A9. IT "Installation and maintenance of heat generation systems through geothermal energy" • A10. IT "Installation and maintenance of heat generation systems through biomass" • A11. IT "Installation and maintenance of aerothermal and thermodynamic solar installations for building" • A12. IT "Energy management of building facilities" • A13. TA "Installation and maintenance of high performance heat pumps" • A21. IF of trainers' technical requalification in EE and RES • Training solar thermal and photovoltaic actions - Plan the implementation of the "Construye 2020" plan. - Identify and select the RESOURCES REQUIRED to carry out the plan. - Establish the evaluation system of the plan

Level of impact	Recipients / implicated	
	**Recipients**	**Implicated**
	Training centers. Companies in the building sector. Workers of the building sector. Trainers of the professional training system of the building area for employment.	Experts in the design of training plans. Companies and training centers. Tripartite Foundation for Employment Training Ministry of Labour Ministry of Education.

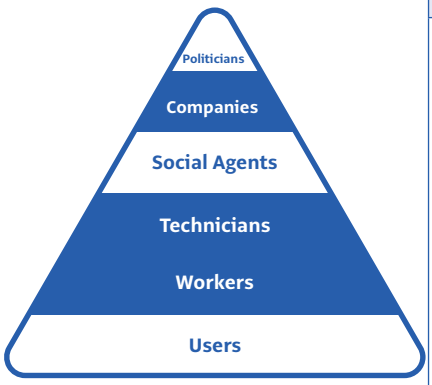
Action plan



Required resources	Financing	
Coordinators and people responsible for training. Experts in the design of sectorial training plans. Technical expertise in designing, planning, technical evaluation of programs and training plans. Teachers.	**Mechanisms**	State subsidies and of the European Union
	Estimated cost	Between 28.135.181€ and 60.249.791€ annually

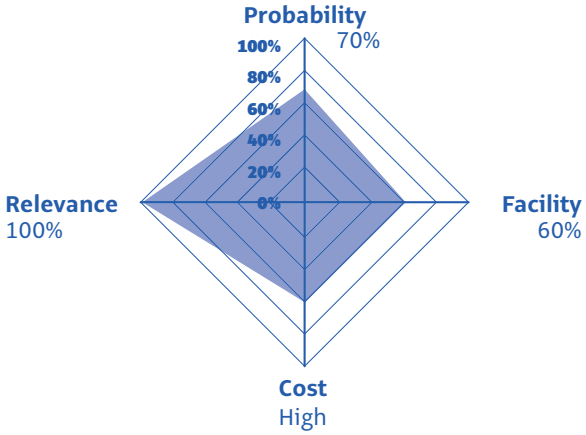
Feasibility analysis	Other information of interest
	Assuming that it was at least the workers estimated to be trained with an average of 90 hours of training per worker, taught between 2013 and 2020, with an average cost of 11€ an hour, it adds that it would be necessary to spend 990€ on average per worker. This is an investment in training between 28.135.181€ and 60.249.791€ per year. Estimates collected in the National Roadmap, point 2.3.4: Number of construction workers to be trained in each sub-sector/occupation for each level of competition to achieve energy goals by 2020.

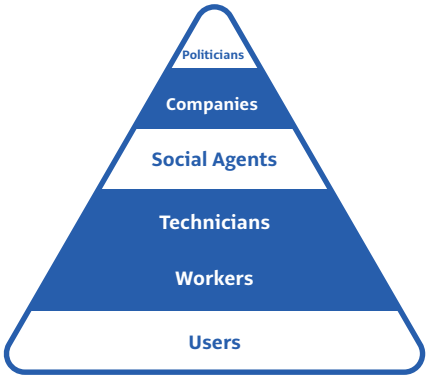
Action 23	
Area that it develops	**Description of the barrier**
Training for Employment.	**Educational and cultural barriers:** Low initial qualification and motivation of workers.
National objectives	
Descripción de la acción	**Elementos de la acción**
Design and development of the certificates of professionalism in e-learning.	The aim is to increase the number of students trained through certifiable training, performing the programming of the certificates and the design of available resources for e-learning platforms. Until now, certificates of professionalism have been made through classroom training. With the e-learning mode the physical barriers and the restrictions on schedules of the face-to-face classes that limit the access of enterprises and workers to training for employment are removed. Likewise this mode allows carrying out the adaptation of the content and activities to the characteristics of the students and the learning outcomes in a flexible way. The main certificates to adapt are those of level 2 of the building and civil works' families, of installation and maintenance and of the family of power and Water. The action elements: - Design, programming and planning the certificates in e-learning. - Perform the microprogramming of each of the certificates. - Define the objectives, contents, activities and learning outcomes. Perform the instructional design. - Choose the technology and the multimedia elements to be used. - Make the scripting of the contents; taking into account the instructional design, specifying the resources, activities and tasks to be used, determining the interface and the devices that will be set for the interaction with the user. - Carry out the jobs of production as set out in the script, the stage design and the planned evaluation system. - Technologically implement the tool, putting the system for its access online into production. - Validate, from a technical and educational point of view, the system developed by recognized experts in the field, through a pilot experience.

Level of impact	Recipients / implicated	
	**Recipients**	**Implicated**
	Training centers. Companies in the building sector. Workers of the building sector. Trainers of the professional training system of the building area for employment.	Companies and training centers. Ministry of Labour Ministry of Education.

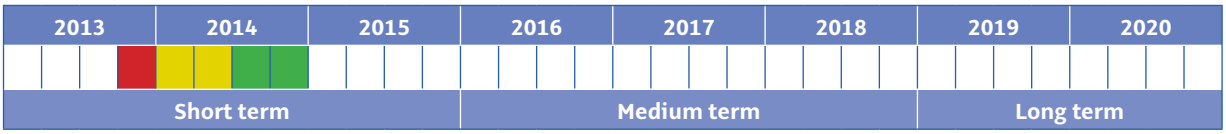
Action plan							
2013	2014	2015	2016	2017	2018	2019	2020
Short term			Medium term			Long term	

Required resources	Financing	
	Mechanisms	State subsidies and of the European Union
Experts in educational planning and scheduling. Designers of multimedia contents. Programmers Experts in content development.	**Estimated cost**	**Direction, coordination and training design technicians =** 20.000€ **Experts in content development** = 10.000€ **Production and implementation of multimedia elements =** 50.000€ **TOTAL:** 80.000€

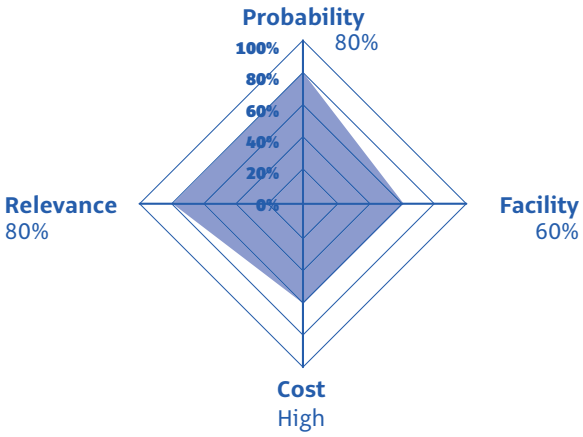
Feasibility analysis	Other information of interest
	The certificates prioritized, to make them available in e-learning are: EOCB0108 2 Masonry factories EOCB0109 1 Auxiliary operation of continuous coatings in construction EOCB0208 1 Auxiliary operation of masonry factories and covers EOCI10 2 Plumber EOCL50 2 Plasterer ENAE0108 2 Assembly and maintenance of solar photovoltaic installations ENAE0208 2 Assembly and maintenance of solar thermal installations ENAS0110 2 Assembly, commissioning, maintenance, inspection and review of reception facilities and gas appliances IMAI0108 1 Plumbing and heating-cooling domestic operations IMAR0208 2 Assembly and maintenance of air conditioning installations and ventilation extraction IMAR0408 2 Assembly and maintenance of heat installations

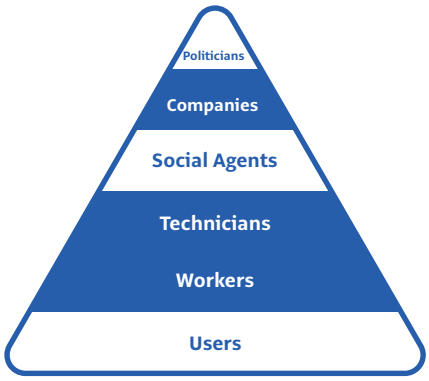
Action 24		
Area that it develops	**Description of the barrier**	
Training for Employment.	**Educational and cultural barriers:** Low initial qualification and motivation of workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Multimedia educational resource for the installation of heating systems using biomass combustion.	The objective is to design, develop and produce a multimedia teaching tool that allows students to experience and understand the procedures for the installation of heating systems using biomass combustion. It will be carried out through the following tasks: -Define the objectives, contents, activities and learning outcomes. Perform the instructional design. -Choosing to use technology and multimedia elements. -Make the scripting of the contents; taking into account the instructional design, specifying the resources, activities and tasks to be used, determining the interface and the devices that will be set for the interaction with the user. -Perform the works of production as set out in the script, the stage design and the planned evaluation system. -Technologically implement the tool, putting the system for its access online into production. -Validate, from a technical and educational point of view, the system developed by recognized experts in the field, through a pilot experience.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Training centers. Companies in the building sector. Workers of the building sector. Trainers of the professional training system of the building area for employment.	Companies and training centers. Ministry of Labour Ministry of Education.

Action plan

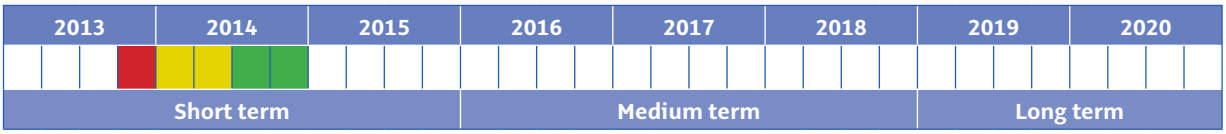


Required resources	Financing	
Experts in the design of multimedia teaching tools 2D and 3D Designer. Programmers Experts in the development of contents. Teacher and students to carry out the pilot experience.	Mechanisms	State subsidies and of the European Union.
	Estimated cost	**Direction, coordination and training design technicians =** 30.000€ **Experts in content development** = 10.000€ **Production and implementation of multimedia elements =** 50.000€ **TOTAL:** 90.000€

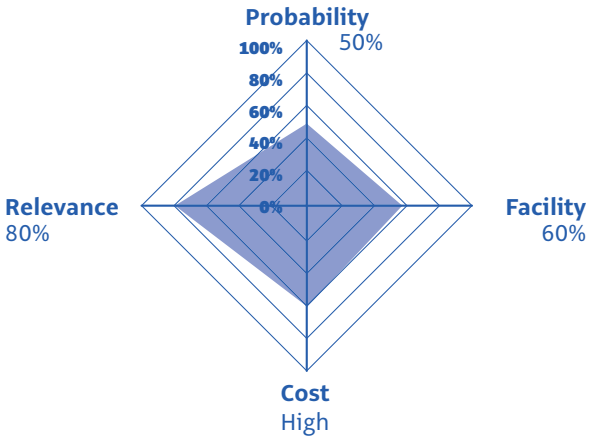
Feasibility analysis	Other information of interest
	The use of such media resources, defined in terms of planned learning outcomes, facilitate the active participation of students in their learning process. The direct connection with the solution to real problems, increase student motivation, transfers learning and satisfaction levels.

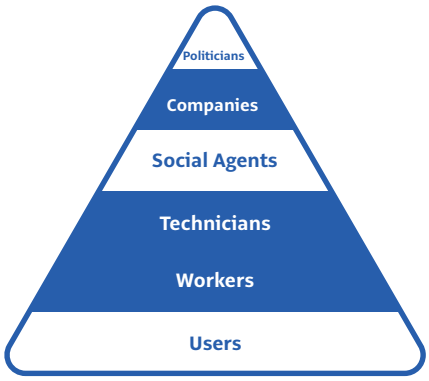
Action 25		
Area that it develops	**Description of the barrier**	
Training for Employment.	**Educational and cultural barriers:** Low initial qualification and motivation of workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Multimedia educational resource for the installation of heating systems by harnessing geothermal energy.	The objective is to design, develop and produce a multimedia teaching tool that allows students to experience and understand the procedures for the installation of heating systems by harnessing geothermal energy. It will be carried out through the following tasks: -Define the objectives, contents, activities and learning outcomes. Perform the instructional design. -Choose the technology and the multimedia elements to be used. -Make the scripting of the contents; taking into account the instructional design, specifying the resources, activities and tasks to be used, determining the interface and the devices that will be set for the interaction with the user. -Perform the works of production as set out in the script, the stage design and the planned evaluation system. -Technologically implement the tool, putting the system for its access online into production. -Validate, from a technical and educational point of view, the system developed by recognized experts in the field, through a pilot experience.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Training centers. Companies in the building sector. Workers of the building sector. Trainers of the professional training system of the building area for employment.	Companies and training centers. Ministry of Labour Ministry of Education.

Action plan

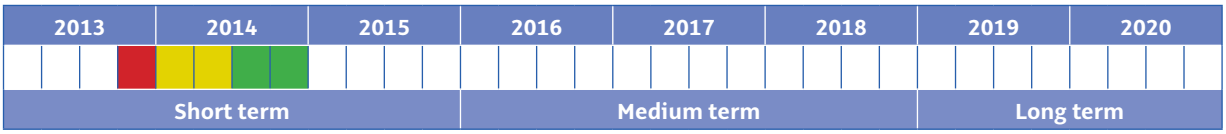


Required resources	Financing	
Experts in the design of multimedia teaching tools 2D and 3D Designer. Programmers Experts in the development of contents. Teacher and students to carry out the pilot experience.	Mechanisms	State subsidies and of the European Union
	Estimated cost	**Direction, coordination and training design technicians =** 30.000€ **Experts in content development** = 10.000€ **Production and implementation of multimedia elements** = 50.000€ **TOTAL:** 90.000€

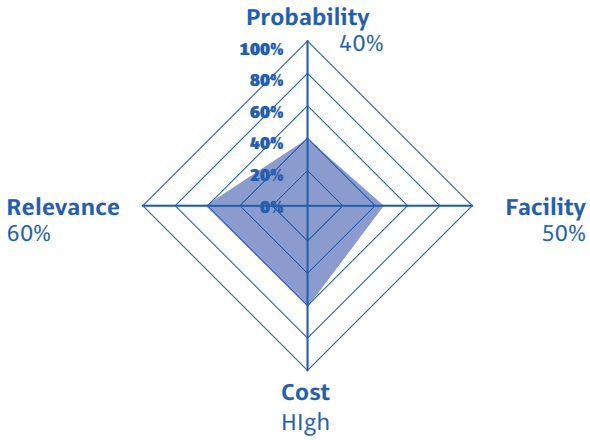
Feasibility analysis	Other information of interest
	The use of such media resources, defined in terms of planned learning outcomes, facilitate the active participation of students in their learning process. The direct connection with the solution to real problems, increase student motivation, transfers learning and satisfaction levels.

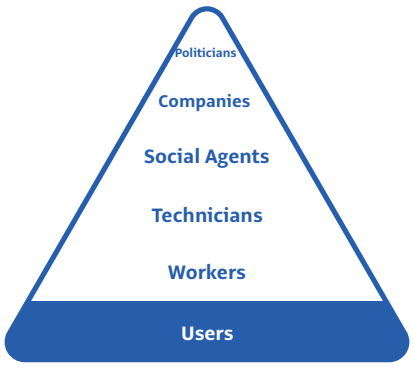
Action 26		
Area that it develops	**Description of the barrier**	
Training for Employment.	**Educational and cultural barriers:** Low initial qualification and motivation of workers.	
National objectives		
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Multimedia educational resource for the installation of other renewable energy systems such as solar thermodynamic and aerothermal.	The objective is to design, develop and produce a multimedia teaching tool that allows students to experience and understand the procedures for the installation of renewable energy systems such as solar thermal and aerothermal. It will be carried out through the following tasks: -Define the objectives, contents, activities and learning outcomes. Perform the instructional design. -Choose the technology and the multimedia elements to be used. -Make the scripting of the contents; taking into account the instructional design, specifying the resources, activities and tasks to be used, determining the interface and the devices that will be set for the interaction with the user. -Perform the works of production as set out in the script, the stage design and the planned evaluation system. -Technologically implement the tool, putting the system for its access online into production. -Validate, from a technical and educational point of view, the system developed by recognized experts in the field, through a pilot experience.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Training centers. Companies in the building sector. Workers of the building sector. Trainers of the professional training system of the building area for employment.	Companies and training centers. Ministry of Labour Ministry of Education.

Action plan

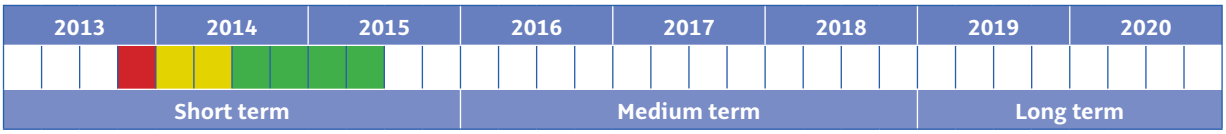


Required resources	Financing	
Experts in the design of multimedia teaching tools 2D and 3D Designer. Programmers Experts in the development of contents. Teacher and students to carry out the pilot experience.	Mechanisms	State subsidies and of the European Union.
	Estimated cost	**Direction, coordination and training design technicians =** 30.000€ **Experts in content development** = 10.000€ **Production and implementation of multimedia elements** = 50.000€ **TOTAL:** 90.000€

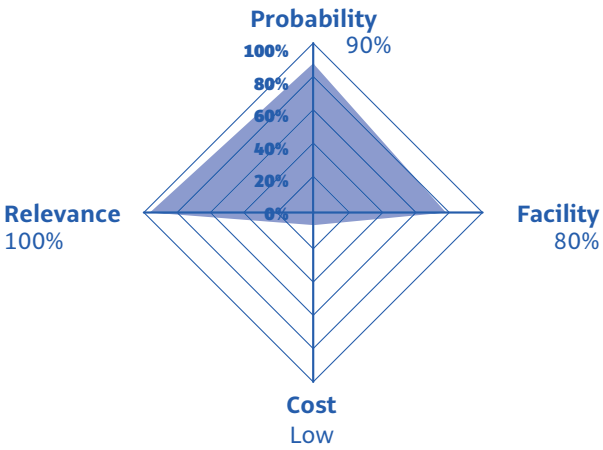
Feasibility analysis	Other information of interest
	The use of such media resources, defined in terms of planned learning outcomes, facilitate the active participation of students in their learning process. The direct connection with the solution to real problems, increase student motivation, transfers learning and satisfaction levels.

Action 27		
Area that it develops	**Description of the barrier**	
Provided incentives of the demand.	**Economic barriers:** Blocking the funding and lack of demand.	
National objectives		
Reduce the energy consumption by promoting new buildings and rehabilitation of the existing ones, with high energy rating.		
Description of the action	**Action items**	
Outreach campaigns aimed at informing about the different solutions available in EE and RES, whose purpose is the provided incentives of the demand for energy rehabilitation amongst the final consumers.	**Build up green in physical support** Development of brochures, banners, posters and items whose end will be to inform and sensitize the end users about the economic, environmental and quality of life advantages of undertaking energy renovations. **Build up green in virtual support** The object of this action will be to report the different milestones of the campaign as well as the launching of the www.buildupgreen.com, website that will inform all the interested parties in economic key and comfort of the different solutions available in EE and RES. **Build up green hot line** Free 900 line to make technical consultations related to EE and RES.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Local administrations. Property administrators. Consumer associations. Business associations.

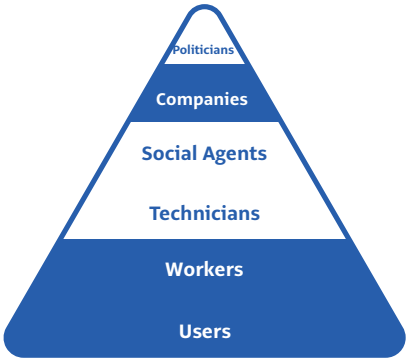
Action plan



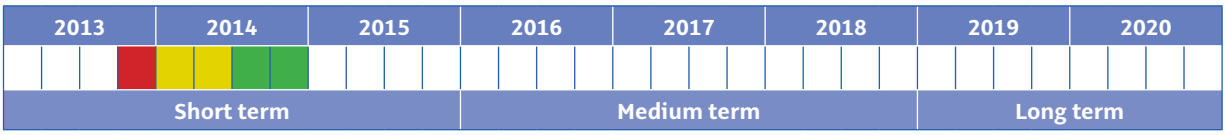
Required resources	Financing	
Experts specializing in marketing Energy advisors for the design of the campaign.	Mechanisms	**Public:** grants from various European and national programs
	Estimated cost	**Build up green in physical support:** 6.000€ **Build up green in virtual support:** 8.000€ **Build up green hot line:** 8.500€ **Total:** 22.500€

Feasibility analysis	Other information of interest
	

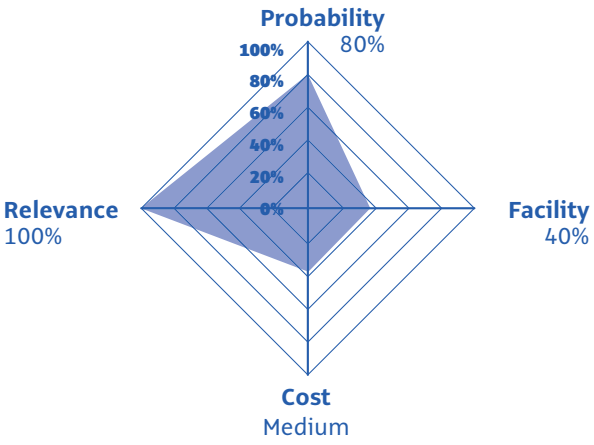
Action 28	
Area that it develops	**Description of the barrier**
Provided incentives of the demand.	**Economic barriers:** Blocking the funding and lack of demand. **Educational and cultural barriers:** initial low qualification workers.
National objectives	
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it. Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.	
Description of the action	**Action items**
Build up green mobile. Awareness campaigns aimed at changing attitudes and awareness about the need to undertake energy rehabilitations and qualify to face a high demand scenario.	This action will have a dual objective: - Advise on the various solutions available in EE and RES, and raise awareness of the need to undertake energy rehabilitations. - Inform and advise on the Professional Qualifications and associated training available to qualify and / or requalify to be a professional in these activities. This information and advice work will be carried out by means of a mobile unit (a specifically adapted and modified bus for this purpose) that would visit each of the 17 Spanish Autonomous Communities (a visit by regional capital). Planned activities: * Talks, presentations, etc., whose purpose is to realize the benefits of undertaking energy rehabilitations. * Talks on Professional Qualifications and training opportunities available to qualify and train in activities related to EE and RES. * Sharing information and incentives whose purpose is to sensitization and awareness. * Open days. * Personalized advice on energy rehabilitation issues and qualification and training issues.

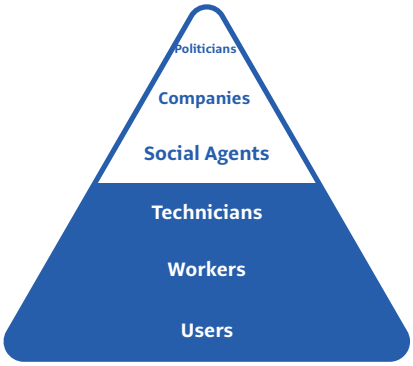
Level of impact	Recipients / implicated	
	**Recipients**	**Implicated**
	Construction workers. SMEs and small developers and property managers. Homeowners. Innkeepers. Dealers.	Local administrations. City Councils. Consumer associations. Business associations.

action plan

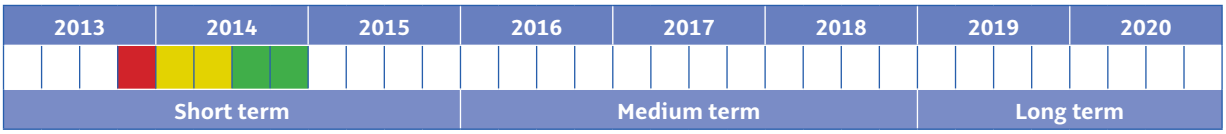


Required resources	Financing	
Experts specializing in marketing. Expert advisers on energy. Expert advisers on qualification and training. Rent and adaptation of the mobile unit.	**Mechanisms**	**Public:** grants from various European and national programs
	Estimated cost	The estimated cost of this action including all the elements is 60.000€.

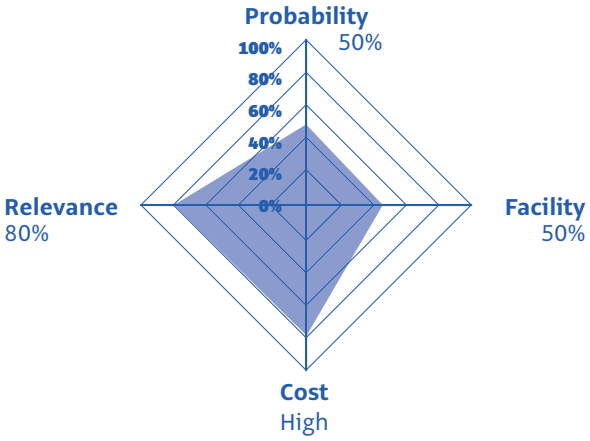
Feasibility analysis	Other information of interest
	

Action 29		
Area that it develops	**Description of the barrier**	
Provided incentives of the demand.	**Economic barriers:** Blocking the funding and lack of demand. **Educational and cultural barriers:** motivation.	
National objectives		
Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it. Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.		
Description of the action	**Action items**	
Energy calculation simulator and energy rehabilitation.	This tool will be available in an application for Android and Apple and will consist of a simulator that will allow users to see and practice those operations aimed at the rehabilitation and improvement of EE and RES in a given building. The simulator will have a dual purpose: - Knowledge of the RES and EE applications, as well as their benefits in terms of economy and comfort by owners and users, contributing to an incentive demand for this type of activities. - Educational resource intended for students and trainers for energy rehabilitation courses.	
Level of impact	**Recipients / implicated**	
	**Recipients**	**Implicated**
	Homeowners. Construction workers. Trainers.	Ministry of Development Universities Business associations User associations

action plan



Required resources	Financing	
Computer developers Expert advisers on energy Expert consultants in training and teaching resources	Mechanisms	**Private:** companies dedicated to EE and RES. **Public:** grants from various European and national programs.
	Estimated cost	The estimated cost of this action including all the elements is 120.000€.

Feasibility analysis	Other information of interest
	

4.2. Proposed Recommendations

After analyzing the results obtained in both the status quo report and in the development of the roadmap itself, the technical team of the project has found that some of the actions proposed by the experts, could be considered more as recommendations than as action measures per se, they are nonetheless to be very interesting and useful to improve deficiencies present in the system, both in energy issues and in skills and training.

In this regard, despite the fact that the concrete actions of intervention are those that perhaps would contribute more directly to the implementation of energy goals for the year 2020, we believe that there are a number of recommendations that in an auxiliary way also support the achievement of the intended purposes.

To this end, this section describes the proposed recommendations, described in a TAB that contains the following sections:

Area that it develops: in this section we indicate which of the priority areas identified in the BUILD UP SKILLS SPAIN platform deals with the action in question.

Description of the barrier: here we identify which of the barriers detected in the status quo report the proposed action seeks to palliate.

National objectives: in this element the national specific objective to which the measure contributes to its achievement, is described.

Description of the recommendation: a brief explanation of the proposed recommendation.

Recommendation items: detailed description of the different factors, components, elements, etc., that form the basis of the proposed recommendation.

Level of impact: pyramid chart indicating at which level or levels the recommendation would affect mostly. Six levels of incidence or impact are considered:

Political Level / Social Agents' Level / Business Level / Technical Level/ Worker's Level / User's Level

Implicated/recipients: identification of those involved in the development and / or implementation of the proposed recommendation as well as the recipients and / or final beneficiaries thereof.

Action plan: timing in the period of the proposed measure between 2013 - 2020, identifying its planned quarter startup in key colours (RED), period considered for execution or development (YELLOW) and estimated time of effective implementation (GREEN).

Required Resources: description of the human and material resources needed for an effective development and implementation of the proposed recommendation.

Other information of interest: other types of relevant information appear in this section to understand the proposed recommendation.

Recommendation nº 1

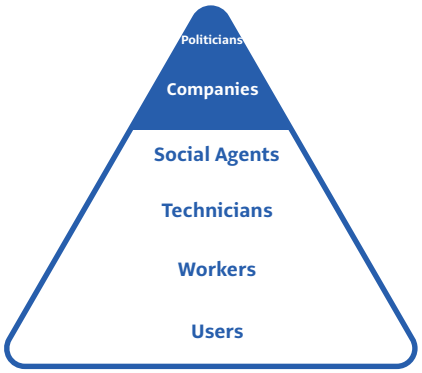
Area that it develops	Description of the barrier
Profitability.	**Structural barriers of the sector:** responsibility of the Builders and Developers.

National objectives

Promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero.

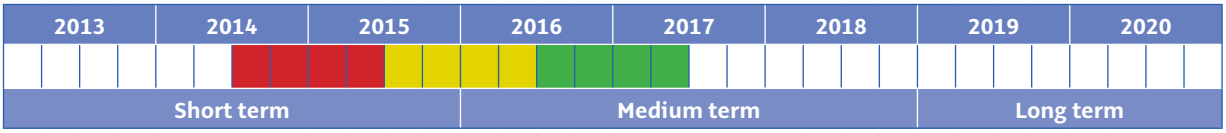
Description of the recommendation	Elements of the recommendation
Assigning an economic value to the reduction of CO_2 emissions.	The aim of this recommendation would be to activate the demand from the point of view of profitability, based on the experience of other EU countries (specifically United Kingdom): - Assigning a value to the CO_2 reductions, so that funding streams aimed at CO_2 reductions can be found. - That this reduction has economic benefits for the energy rehabilitation promoter.

Level of impact



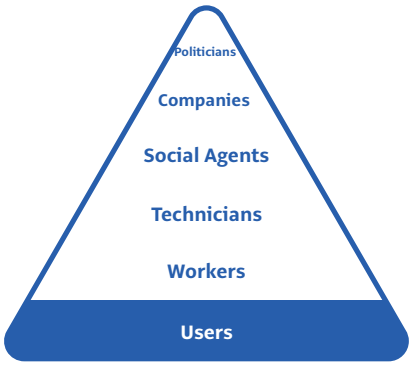
Recipients	Implicated
Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Ministry of Industry. Ministry of Development. Promoting Companies.

Action plan

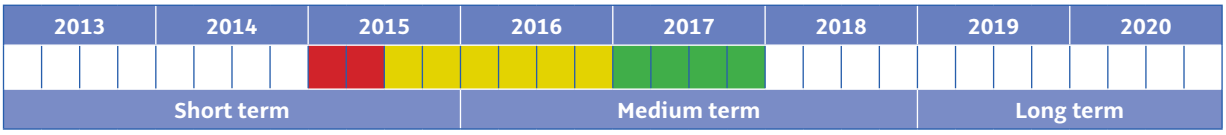


Required resources	Other information of interest
Technical staff for conducting the economic survey of emissions. Study visits.	

Recommendation nº 2	
Area that it develops	**Description of the barrier**
Profitability.	**Economic barriers:** Blocking the funding and lack of demand.
National objectives	
Reduce the energy consumption by promoting new buildings and rehabilitation of the existing ones, with high energy rating.	
Description of the recommendation	**Elements of the recommendation**
Destination of economic resources by the administrations, to promote the adoption of cost-effective EE measures for the end user.	This recommendation would help to alleviate the current shortage of investment and public subsidies to pay for the initial investment of implementing energy efficiency measures in buildings as a strategy for promoting energy rehabilitation. Its elements would be: - Establishment of grant and subsidy programs for promoting the implementation of energy saving measures, which positively impact on profitability studies, previously conducted by specialized companies. - The initiatives would go directly aimed at the end user of the buildings (owners) as an incentive element in the demand.

Level of impact	Recipients / implicated	
	Recipients	**Implicated**
	Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Government of Spain Autonomous Communities Ministry of Industry Ministry of Development Ministry of Economy and Competitiveness

Action plan



Required resources	Other information of interest
Technical staff expert in profitability studies Technical staff energy experts Legislators	

Recommendation nº 3

Area that it develops	Description of the barrier
Building with EE criteria.	**Economic barriers:** Blocking the funding and lack of demand.

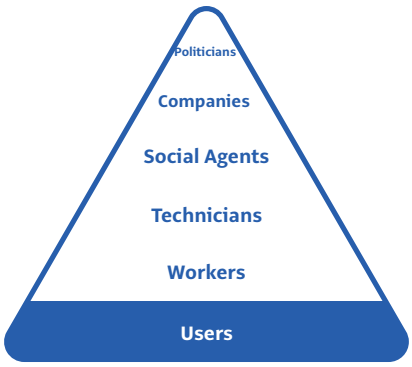
National objectives

Reduce the energy consumption by promoting new buildings and rehabilitation of the existing ones, with high energy rating.

Promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero.

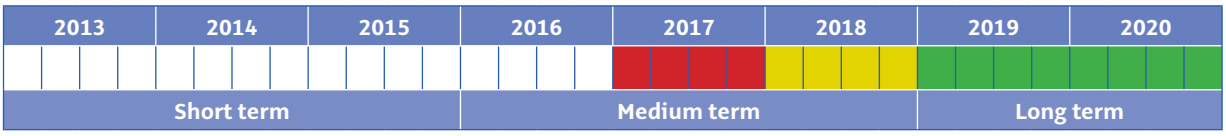
description of the recommendation	elements of the recommendation
Establish tax benefits to companies and individuals who undertake energy rehabilitation measures in their assets.	This recommendation would help boost demand for energy rehabilitation by establishing tax benefits (e.g. a reduction in the Property Tax) to those companies or individuals that implement efficient measures from the point of view of energy in the buildings in which they are users. This recommendation would be closely related to the energy rating of the building, which would be the judgment element to determine the amount of the tax reduction applied.

Level of impact



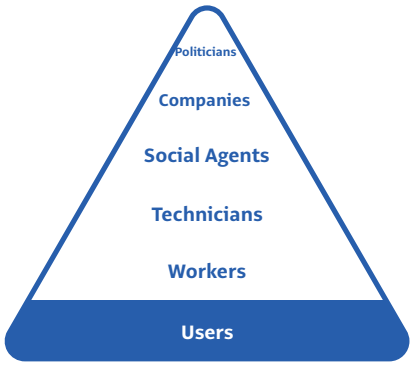
Recipients	Implicated
Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Government of Spain Autonomous Communities Ministry of Industry Ministry of Development Ministry of Economy and Competitiveness

Action plan



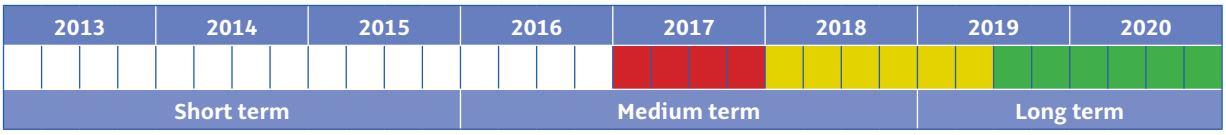
Required resources	Other information of interest
Technical staff energy experts Energy auditors Legislators	

Recommendation nº 4	
Area that it develops	**Description of the barrier**
Building with EE criteria.	**Economic barriers:** Economic crisis and reorientation of the activity.
National objectives	
Promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero.	
Description of the recommendation	**Elements of the recommendation**
Basis of a new system of grants based on energy efficiency targets.	The objective of this recommendation would be to develop a new model of allocation of grants based on the improvement of the energy certification of the buildings, that the energy savings based on the energy efficiency of the building should come first, to thus encourage the demand and the reorientation of the activity: - Subsidy dependent on the energy-efficient performance of the building. - Grant linked to the final results obtained, in economic environmental and comfort terms.
Level of impact	**Recipients / implicated**



Recipients	Implicated
Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Government of Spain Autonomous Communities Ministry of Industry Ministry of Development Ministry of Economy and Competitiveness

Action plan



Required resources	Other information of interest
Technical staff energy experts Legislators	

Recommendation nº 5

Area that it develops	Description of the barrier
Building with EE criteria.	**Economic barriers:** Economic crisis and reorientation of the activity. Blocking the funding and lack of demand.

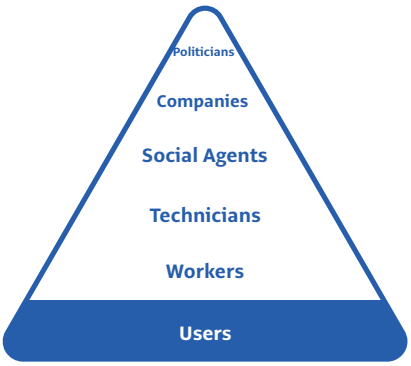
National objectives

Reduce the energy demand for heating and cooling of the existing buildings through energy rehabilitation of the thermal envelope as a whole or in any of the elements that compose it.

Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings.

Description of the recommendation	Elements of the recommendation
Legislation of the energy certification of the existing buildings.	The purpose of this recommendation would be to boost the final publication of the Royal Decree on energy certification of the existing buildings. This is one of the measures that all the experts consulted in various forums and meetings consider elemental to boost demand and permanently reorient building activities. This rule would have, among other benefits, the possibility to differentiate from an energy point of view some buildings from others, which has some very important implications in activities such as buying and selling, renting, etc. That is, the energy rating of a building would become an element of judgment and competitiveness when buying or renting a home, shop, office, etc., which on the other hand would foster an increase in demand for EE and RES activities, by the natural tendency of the owner to have a more competitive and attractive building for the market.

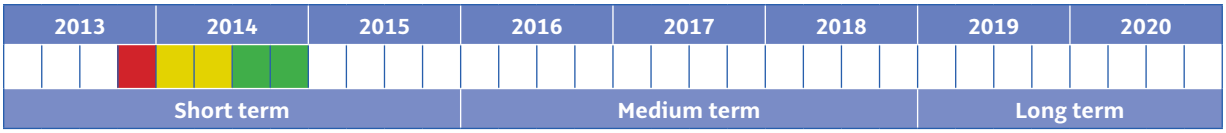
Level of impact



Recipients / implicated

Recipients	Implicated
Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Government of Spain Autonomous Communities Ministry of Industry Ministry of Development Ministry of Economy and Competitiveness

action plan



Required resources	Other information of interest
Legislators	

Recommendation nº 6

Area that it develops	Description of the barrier
Installations of renewable energy systems.	**Economic barriers:** Economic crisis and reorientation of the activity.

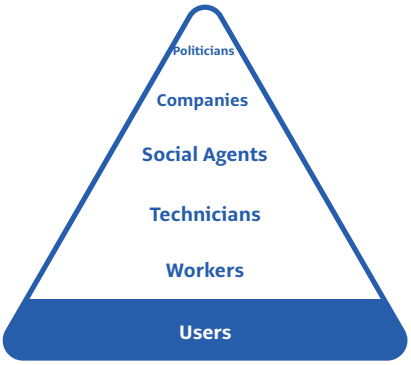
National objectives

Reduce the energy consumption by promoting new buildings and rehabilitation of the existing ones, with high energy rating.

Promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero.

Description of the recommendation	Elements of the recommendation
Regulation of the internal consumption in the homes of the energy coming from renewable energy.	This recommendation would help to alleviate the existing legislative gap regarding the internal consumption regulation by the building users of the energy produced by renewable energies, since nowadays; the excess energy produced is not used for self supply, but "sold" to the power supply companies.

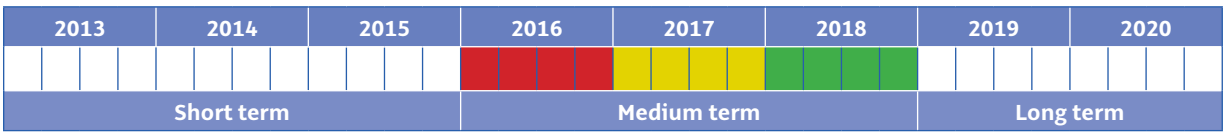
Level of impact



Recipients / implicated

Recipients	Implicated
Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Government of Spain Autonomous Communities Ministry of Industry Ministry of Development Ministry of Economy and Competitiveness Power supply companies

Action plan



Required resources	Other information of interest
Technical staff energy experts. Legislators.	

Recommendation nº 7

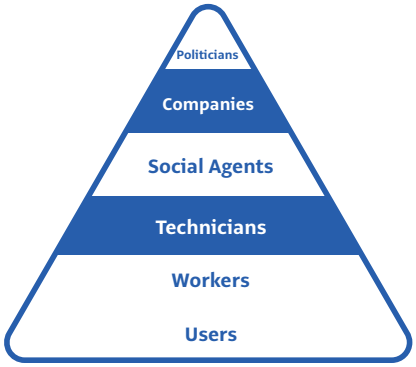
Area that it develops	Description of the barrier
Professional qualifications.	**Structural barriers of the sector:** Traditionalism of the sector. **Educational and cultural barriers:** motivation.

National objectives

Transversal to all the targets.

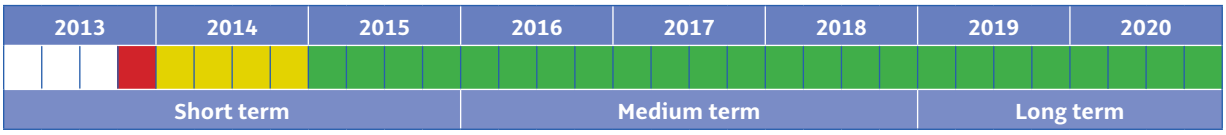
Description of the recommendation	Elements of the recommendation
Increased calls for recognition procedures and accreditation of skills in UCs related to EE and RES.	Calls for accreditation in the EE and RES areas, on a priority basis in the qualifications and competency units related to professions and regulated activities.

Level of impact



Recipients	Implicated
Training and accreditation institutions. Construction workers.	Departments of education and employment of the Autonomous Communities Social agents

Action plan



Required resources	Other information of interest
Technical staff of the institutions involved.	

Recommendation nº 8

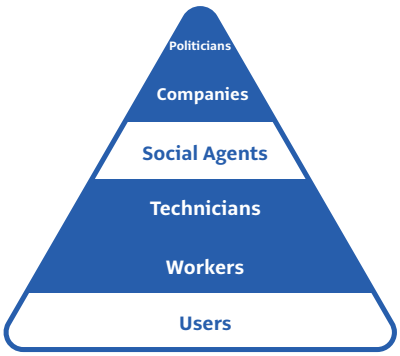
Area that it develops	Description of the barrier
Training for Employment.	**Administrative Barriers:** SMEs' access to training.

National objectives

Transversal to all the targets.

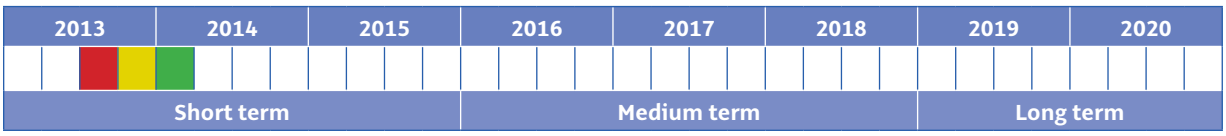
Description of the recommendation	Elements of the recommendation
Establish training in EE and RES as priority issues in the call for tender plans offering grants for employment training.	The purpose of this recommendation is that the competent Administration granting public subsidies for the provision of offer training, considers EE and RES as an innovative, emerging sector with identified qualification needs. The rules governing the subsystem of professional training for employment, regarding the offer training and which determines the regulatory basis for granting public subsidies to their funding, establishes as priority training areas those aimed at anticipating the qualification needs of the new production model and those aimed at developing the most innovative sectors. The competent Administration will establish such areas in the corresponding calls. In any case, those concerning the internationalization of the company, the entrepreneurship, the innovation and the technological development of the productive processes are considered priority areas. (Order TAS/718/2008).

Level of impact



Recipients	Implicated
Construction workers. FPE Trainers Technicians and training experts. Training centers	Government of Spain Autonomous Communities Ministry of Labour Ministry of Education

Action plan



Required resources	Other information of interest
Transfer of information from experts in job training and experts in EE and RES with the relevant authorities.	

Recommendation nº 9

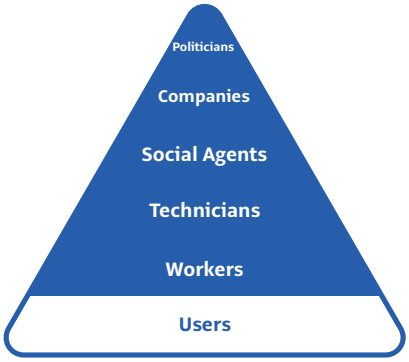
Area that it develops	Description of the barrier
Training for Employment.	**Administrative Barriers:** SMEs' access to training.

National objectives

Transversal to all the targets.

Description of the recommendation	Elements of the recommendation
Proposed regulatory changes in the system of training for employment.	The purpose of this recommendation is that the management regulation of the national qualifications catalog as a reference framework for the design of the offer of titles and certificates of professionalism should be amended to allow greater flexibility and agility in management. On the other hand and within the regulatory environment itself, it is recommended as necessary to promote open calls for accreditation processes of skills acquired through experience and informal learning, so that through the collaboration with sectoral organizations they streamline these processes to increase the qualifications in the sector.

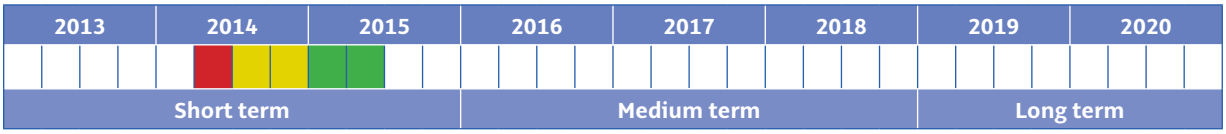
Level of impact



Recipients / implicated

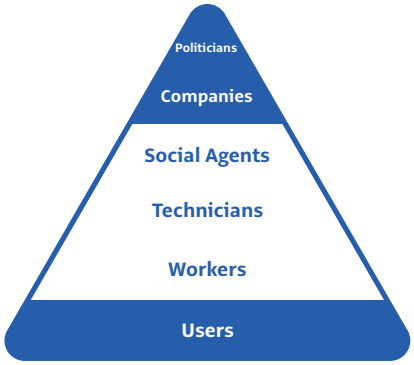
Recipients	Implicated
Construction workers. FPE Trainers Technicians and training experts. Training centers Sector entities.	Government of Spain Autonomous Communities Ministry of Labour Ministry of Education INCUAL Sectoral institutions

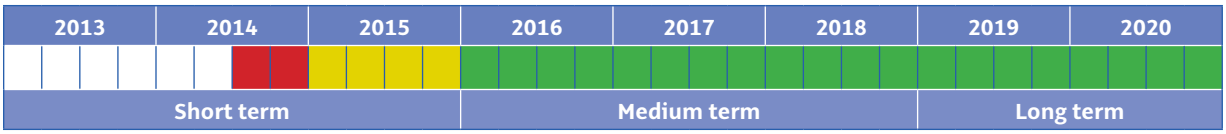
Action plan



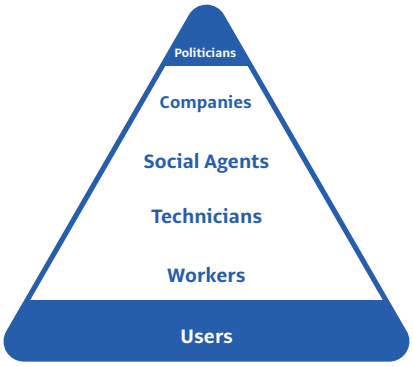
Required resources	Other information of interest
Transfer of information from industry experts and governments and institutions with competence in promoting policy changes.	

Recommendation nº 10	
Area that it develops	**Description of the barrier**
Provided incentives of the demand.	**Economic barriers:** Economic crisis and reorientation of the activity.
National objectives	
Reduce the energy consumption of the thermal facilities for heating, cooling and domestic hot water production of the existing buildings. Promote the construction of new buildings or rehabilitation of the existing ones so that they have an energy consumption of almost zero.	
Description of the recommendation	**Elements of the recommendation**
Basis of a new system of grants based on the implementation of RES in building.	The objective of this recommendation would be to develop a new model of allocation of grants based on the improvement of the energy certification of the buildings, that the energy savings based on the energy efficiency of the building should come first, to thus encourage the demand and the reorientation of the activity: - Subsidy dependent on the energy-efficient performance of the building. - Grant linked to the final results obtained, in economic environmental and comfort terms.

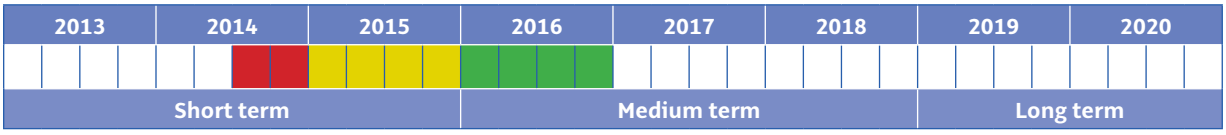
Level of impact	Recipients / implicated	
	**Recipients**	**Implicated**
	Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings. Entrepreneurs.	Ministry of Industry Ministry of Development

Action plan	
	
Required resources	**Other information of interest**
Technical staff trained to certify the improvements. Software and building certification methods recognized by the Ministry of Industry.	

Recommendation nº 11	
Area that it develops	**Description of the barrier**
Provided incentives of the demand.	**Economic barriers:** Blocking the funding and lack of demand.
National objectives	
Transversal to all the targets.	
Description of the recommendation	**Elements of the recommendation**
Instituting policy changes that encourage demand.	The purpose of this recommendation would be to enter all those regulatory changes that contribute to a strong demand stimulation among others: - Apply the European Directive which imposes 3% renovation of public buildings. - Updating the Technical Building Code. - Publication of the Royal Decree of Energy Efficiency Certification of existing buildings. - Promotion of white certificates. - Legislation on the regulation of the private consumption.

Level of impact	Recipients / implicated	
	Recipients	**Implicated**
	Owners and users of housing. Owners and users of commercial premises, offices and small buildings intended for the services sector. Owners and users of large commercial buildings.	Government of Spain Autonomous Communities Ministry of Industry Ministry of Development

Action plan



Required resources	Other information of interest
Technical experts on energy certification. Legislators.	

5. Conclusions

El establecimiento de la hoja de ruta se ha realizado en base al análisis exhaustivo de la situación del sector The establishment of the roadmap has been made based on the thorough analysis of the situation of the construction sector in terms of compliance with the European energy targets in 2020, in order to carry out a prospective analysis of the competence needs of the workers that are deemed necessary for meeting the goals in 2020.

From this analysis, the conclusions related to the occupations identified as most important, the competences related to Energy Efficiency and Renewable Energy Systems identified as key in the construction and rehabilitation of buildings, the related training and finally the barriers identified to achieving energy objectives, have been decisive in the configuration of the Roadmap.

Thus, we have defined a total of 29 actions and 11 recommendations intended to contribute to the attainment of the abovementioned objectives at different levels and areas of action, thereby ensuring gradual and prioritized implementation of the various measures proposed.

Moreover, the involvement throughout the project, of the most relevant agents in terms of qualification and vocational training in the field of construction and energy saving, have made it easier to establish a roadmap adapted to the needs and structural characteristics of our country. The actions and recommendations are supported by the main agents of the building sector, the professional training and the institutions involved in the achievement of the European energy saving targets in 2020.

It has the support of institutions both in the technical field, as in the workers representatives' field, of the business representation, the scope of the training centers and of the institutional fields.

With the participation of experts, the proposed actions and recommendations to get the qualified labor in EE and RE, detected as necessary by the year 2020, have been detailed in TABs.

We have tried, through a consensus among experts, to establish a prioritization of actions, depending on the criteria of relevance, probability, ease and estimated cost of the action: The difficulty of this task happens because of its subjective criteria that try to objectify itself through the assessment of technicians and experts with extensive experience in the valued actions.

Therefore, the box on the next page where the actions described appear prioritized, which have been ranked according to these key criteria, serves as a final conclusion:

1. The relevance refers to the importance of the proposed action in achieving the 20-20-20 targets.
2. The probability referring to the existing perspective for the action can be developed and implemented taking into account the current and future situation.
3. The facility refers to the disposition and developments available from the technical standpoint.
4. Estimated cost for the initiation, development and implementation of the action.

Tab nº	Action	Relevance	Probability	Facility	Cost euros
10	Biomass Itinerary	100%	100%	80%	55.000,00 €
18	Skills development and certifiable associated training: geothermal	100%	100%	70%	15.000,00 €
4	Course aluminum and PVC metalwork	100%	90%	90%	19.200,00 €
27	Campaign disclosure EE and RES available solutions	100%	90%	80%	8.500,00 €
3	Placement of insulation itinerary	100%	90%	80%	55.000,00 €
15	Integrated platform for information and guidance	100%	90%	80%	80.000,00 €
17	Review of existing qualifications	100%	90%	70%	49.500,00 €
9	Geothermal energy itinerary	100%	90%	60%	55.000,00 €
14	Observation network of EU development skills	100%	80%	60%	50.000,00 €
28	Build up green mobile	100%	80%	40%	60.000,00 €
19	Observatory regarding EE and RE.	100%	80%	40%	95.000,00 €
23	Design and development of the certificates of professionalism in e-learning	100%	70%	60%	80.000,00 €
22	Global training plan "Construye 2020".	100%	40%	50%	**15**
1	TA on profitable economic parametres in EE	90%	90%	90%	19.200,00 €
8	TA "The renewable energy systems in buildings"	90%	90%	80%	19.200,00 €
6	TA "Energy efficiency in buildings"	90%	90%	60%	19.200,00 €
21	IF of trainers' technical requalification	90%	70%	80%	58.000,00 €
16	Creation of a workgroup to address the SNCFP Assessment	80%	100%	90%	30.000,00 €
5	Heating and cold and DHW itinerary	80%	80%	70%	55.000,00 €
24	TR for the installation of biomass	80%	80%	60%	90.000,00 €
2	TA on the impact on the consumption and energy billing	80%	70%	90%	19.200,00 €
20	Thematic networks of experts	80%	60%	40%	60.000,00 €
25	TR for geothermal energy	80%	50%	60%	90.000,00 €
29	Energy calculation and energy rehabilitation simulator	80%	50%	50%	120.000,00 €
13	Course of high performance heat pumps	60%	90%	80%	35.500,00 €
12	Energy Management Itinerary	60%	70%	60%	55.000,00 €
7	Lighting course according to CTE	60%	60%	80%	19.200,00 €
11	Aerothermal and solar thermodynamics itinerary	60%	50%	50%	55.000,00 €
26	TR for aerothermal and solar thermodynamics	60%	40%	50%	90.000,00 €
				TOTAL	1.456.700,00 €

Figure 45. Actions of the roadmap prioritized according to the criteria of relevance, probability and facility

[15]The overall training plan "Construye 2020" is not valued economically in this prioritization. The estimated cost figures in the TAB of action 22

6. Testimonials

In the following link you can find a video with some testimonials of the most representatives institutions in technical field, and the field of workers' representatives, the business representation, the scope of training centres and Institutional area have supported our RoadMap, in order of appearance:

Oscar Redondo, *Architect*

Juan Lazcano, *President of the National Confederation of Construction*

Vicente Sanchez, *Secretary General of Fecoma-CCOO*

Manuel Fernandez "Lito", *Secretary General of MCA-UGT*

Enrique Corral, *General Manager of the Labour Foundation for Construction*

José Antonio Quiles, *Coordinator of the National Institute of Qualifications*

Alfonso Luengo, *Managing Director of the Tripartite Foundation for Training in Employment*

Javier Serra, *Coordinator Sustainable Building Unit of the Ministry of Public works*

Link: http://www.youtube.com/user/fundacionlaboral

7. References

BUILP SKILLS SPAIN	http://spain.buildupskills.eu/
• Status quo report	
National Institute of Statistics	http://www.ine.es/
• Population and Housing Census 2001 • Central Companies Directory (DIRCE) • Labour Force Survey • Quality of life at work • Survey of wages in the industry and the services • Wage structure survey • Annual labour cost survey • Registered unemployment and labor movement recorded • Working conditions and labor relations • National Accounts of Spain • Housing Price Index • Price indexes of materials and national rates of the workforce • Construction statistics • Household budget survey • National classifications • International classifications	
Ministry of Industry, Tourism and Trade	http://www.minetur.gob.es/es-ES/Paginas/index.aspx
• Energy planning • Statistics and energy balances • Energy and sustainable development • Institute for Diversification and Energy Saving (IDAE) • Construction Industrial Observatory	
Construction Industrial Observatory	http://www.minetur.gob.es/industria/observatorios/SectorConstruccion/Paginas/miembros
• Study of the competitiveness of the construction industry in Spain. 2011. • Study on the Impact of the Technical Building Code on the construction processes. 2010. • Study on the productive Interrelations of the construction sector and the materials' industry. Identification of professional profiles and associated training. 2009.	

Institute for Diversification and Energy Saving (IDAE)	http://idae.electura.es/
• Sech-Spahousec Project: Analysis of the energy consumption in the residential sector in Spain • Renewable Energy Plan (PER) 2011-2020 • Savings Plan and Energy Efficiency 2011-2020. 2nd National Action Plan for Energy Efficiency of Spain • Guide External Thermal Insulation Systems (SATE) for the Rehabilitation of the Thermal Enclosure of the Buildings • Energy Handbook for the rehabilitation of buildings. The insulation, the best solution • Energy rating scale. Existing buildings • Energy rating scale. New buildings	
Ministry of Development (Statistics	http://www.fomento.gob.es/MFOM/LANG_CASTELLANO/ESTADISTICAS_Y_PUBLICACIONES/INFORMACION_ESTADISTICA
• Construction • Housing and urban actions • Yearbook, summary statistics and bulletin	
Ministry of Education, Culture and Sports (Documentation)	http://www.educacion.gob.es/horizontales/documentacion.html
• Publications • Education statistics • All VT Portal • National Institute of Qualifications • General Vocational Training Council	
Statistics of the Ministry of Employment and Social Security	http://www.empleo.gob.es/es/estadisticas/index.htm
• Labour market • Labour market policies. Vocational training and employment support measures • Working conditions and labour relations • Survey of Quality of Life at Work • State Public Employment Service	
State Public Employment Service	http://www.sepe.es/
• Employment and training • Labour market • Statistics: employment, training, contracts	
Construction Labour Foundation	http://www.fundacionlaboral.org/
• Report 2011 Ver para creer (Seeing is believing) • Report 2010 Gracias a muchos (Thanks to many) • Projects	

Institute of Construction Technology (AIDICO)	http://www.aidico.es/
• Market observatory of the construction and housing • Documentation	
Bank of Spain (Statistics)	http://www.bde.es/webbde/es/estadis/estadis.html
• Statistical Bulletin • Economic indicators • Summary of indicators • Financial Accounts of the Spanish Economy	
Red Eléctrica de España (Spanish Power System)	http://www.ree.es/publicaciones/publicaciones_on_line.asp
• Publications	
Buildings Performance Institute Europe	http://www.bpie.eu/
• Publications	
Euroconstruct	http://www.euroconstruct.org/
• Publications	
University of Linz	http://www.euroconstruct.org/
• The Shadow Economy in Europe, 2011. Dr. Friedrich Schneider, Johannes Kepler University of Linz, Austria; A.T. Kearney.	

8. Glossary

EUROCONSTRUCT: is the main network for construction, finance and business forecasting in Europe.

Energy Efficiency (EE): Energy efficiency or energy saving is a practice employed during energy consumption that aims to strive to reduce energy use but with the same final result.

Renewable Energies (RES): we call renewable energy to the energy obtained from virtually inexhaustible natural sources, either by the vast amount of energy they contain, or because they are able to regenerate by natural means.

Shadow economy: all economic activity beyond the control of the tax system of the country.

Biofuels: hydrocarbon mixture that is used as fuel in internal combustion engines and which is derived from biomass.

Organic Law: The Organic Law is that which requires the favorable vote of the absolute majority of the members of the Congress of Deputies in a final vote on the entire project approved.

Royal Decree: legal standard with a rank of regulations emanating from the executive power (the Government)

SECH-SPAHOUSEC Project: an analysis study of the energy consumption in the residential sector in Spain.

Terajules: unit derived from the International System used to measure energy, work and heat.

Toe: tonnes of oil equivalent.

Plan Renove: The Appliance Plan Renove is one of the measures of Savings Action Plan and Energy Efficiency 2005-2007, which has also been included in the second ACTION PLAN 2008-2012.

MW: the megawatt is a unit of power in the International System equivalent to one million watts.

Discussion Group: qualitative research technique that involves bringing together a group of 5-8 people to discuss a particular topic on which they are experts.

Profitability: ability to produce or generate additional profit on the investment or effort made.

E-community: virtual community that allows you to be informed of everything that happens around a certain topic and work in its development collaboratively.

District heating: heating in which the heat (thermal energy) is distributed throughout an urban network.

Enthalpy: thermodynamic quantity, symbolized by the capital letter H, whose variation expresses a measure of the amount of energy absorbed or given by a thermodynamic system.

Aerothermy: combination of a heat pump and an accumulator that uses heat from the air as a renewable source to produce hot water.

Solar thermodynamics: does not directly use solar radiation but it absorbs heat from the environment through panels, allowing it to work in both sunny and cloudy days, and even during night hours.

Certificates of professionalism: The certificates of professionalism, regulated by Royal Decree 34/2008, of January 18th, are the instrument of official accreditation of the Professional Qualifications of the National Catalogue of Professional Qualifications in the field of Labour administration.

Training "in company": training in which the teaching team moves directly to the workplace, along with all the necessary means to provide for the course material.

ICT: Information Technology and Communication

ANNEX I: Index of Figures

Figure 1: Estimated growth of the construction sector. Source : EUROCONSTRUCT

Figure 2: Decrease in construction from 2008 to 2012. Source: INE.

Figure 3: Estimate by workers' scenarios to train per year. Source: Authors.

Figure 4: The most important building occupations in EE and RES with the greatest need for training. Source: status quo.

Figure 5: Competences with training needs. Source: status quo.

Figure 6: Roadmap actions

Figure 7: Roadmap recommendations

Figure 8: Action plan for the implementation of the actions of the roadmap

Figure 9: Plan of action for implementing the recommendations of the roadmap

Figure 10. Approvals of the site management: Number of homes. Source: Ministry of Development

Figure 11. Active, employed and unemployed in the construction sector (thousands of people). Source: INE

Figure 12. Economic contribution of the construction sector. Source: INE

Figure 13. Demand factors having a negative effect on the construction sector.

Figure 14. Weight of the domestic and foreign workers in the construction sector. Source: INE

Figure 15. Training for employment initiatives

Figure 16. Tools and actions of the SNCFP

Figure 17. Tools and actions of the SNCFP

Figure 18. Distribution of employees by activity branch in the construction sector. Source: INE

Figure 19. Structure of employment in the construction sector and total employment in Spain. 2011. Source: INE: Exploiting EPA IIT Microdata 2011

Figure 20. Structure of the training level of workers in the construction sector and total employment in Spain. 2011. Source: INE: Exploiting EPA IIT Microdata 2011

Figure 21. Breakdown according to Thermal and Electrical Consumption.. Source: IDAE

Figure 22: Distribution of the population in Spain in 2001 and types of weather. (Source: Authors from data of the National Statistical Institute and the IDAE).

Figure 23. Total consumption in houses according to the climate zone. Source: IDAE

Figure 24. Total consumption percentage in the existing homes in each climate zone. Source: Authors from the data in the Housing and Population Census 2001, carried out by the National Statistical Institute and the SECH-SPAHOUSEC Project developed by the IDAE.

Figure 25. Power installed on December 31st 2011 relating to renewable energies. Source: Spanish Electrical Network

Figure 26. Ministry of Industry, Trade and Tourism, IDAE Savings Action Plan and Energy Efficiency 2011-2020.

Figure 27. Ministry of Industry, Trade and Tourism, IDAE Savings Action Plan and Energy Efficiency 2011-2020.

Figure 28. Estimated primary energy savings for 2020 per country

Figure 29. Summary table by measures of the construction sector and equipment. Source: Savings Action Plan and Energy Efficiency 2011-2020

Figure 30. Estimate of the approximate costs of the energy rehabilitation based on different construction solutions. Source: Savings Action Plan and Energy Efficiency and their Authors.

Figure 31. Investment in housing by countries expressed in % of the GDP. Source: Bank of Spain. The residential investment adjustment in Spain: the current situation. Economic Bulletin, December 2010.

Figure 32. Sectoral dynamics of the production system June 2011 to 2012. Source: Tripartite Foundation for Employment.

Figure 33. Sectoral dynamics of the production system June 2011 to 2012. Source: Tripartite Foundation for Employment.

Figure 34. Labour Force Survey. Detailed Results. Source: INE

Figure 35. Estimation of workers to train per year. Source: Authors.

Figure 36. Estimated number of students and trainers. Source: Authors.

Figure 37. Occupations in need of training. Source: Status quo.

Figure 38. Competences in EE and RES training needed. Source: Authors.

Figure 39. Qualifications and training available and identification of needs. Source: Authors.

Figure 40. Pillars for defining the strategy for the development of the roadmap

Figure 41. Detail methodology for defining the roadmap

Figure 42. Devices to use the platform

Figure 43. Structure of the BUILD UP SKILLS SPAIN platform

Figure 44. Methodology of the e-communities

Figure 45. Actions of the roadmap prioritized according to the criteria of relevance, probability and facility.

BUILD UP Skills

The EU initiative on the building workforce development in the field of energy efficiency and renewable energies.

BUILD UP Skills is a strategic initiative promoted by the Intelligent Energy Europe program (IEE) to promote further or higher education and training of skilled workers and other construction workers and installers in the construction sector.

The ultimate objective is to increase the number of skilled workers across Europe to provide rehabilitation with high energy efficiency criteria as well as the innovative buildings of almost zero energy consumption.

The initiative addresses the abilities in relation to energy efficiency and renewable energies in all types of buildings.

Build Up Skills has two phases:

I. First, the goal is the creation of national qualification platforms and roadmaps to successfully train the construction workforce in order to meet the targets for 2020 and beyond.

II.Based on the roadmaps, the second step is to facilitate the introduction of new skills and / or improve the existing qualification and training plans.

Throughout the entire duration of the initiative, regular exchange activities at EU level are organized to emphasize the European dimension of this important initiative and encourage learning among countries.

BUILD UP Skills initiative contributes to the objectives of the two flagship initiatives of the Commission "European 2020 Strategy": "Efficient resources in Europe" and "Agenda for new skills and jobs".

It is part of the Commission Action Plan for Energy Efficiency 2011. It will also enhance the interactions with existing structures and funding instruments such as the European Social Fund (ESF) and the Lifelong Learning Program and it will be based on the European Qualifications Framework (EQF) and learning outcomes approach.