

O1 Energy auditors competences and professional profiles

Project Title	Energy Auditors Competencies, Training and Profiles	
Acronym	ENACT	
Grant Agreement Number	2014-1-IT01-KA202-002672	
Deliverable Number	O1	
Deliverable Name	Energy auditors competencies and professional profiles	
Date of Delivery	Rev. 0 - 12/02/2015 Rev. 1 - 24/02/2015 Rev. 2 - 6/03/2015 Rev. 3 - 17/03/2015 Rev. 4 - 08/05/2015	Rev. 5 – 19/05/2015 Rev. 6 - 21/05/2015 Rev. 7 - 22/05/2015 Rev. 8 – 30/06/2015
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O1A1 – Comparative Research Report

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1. ENACT Project overview

Starting on September 1st 2014 and lasting for 24 months, ENACT is a European initiative, financed within the ERASMUS+ programme, which aims to contribute to the definition and implementation of a common frame for the professional qualification and competences of energy auditors.

Funded within the Erasmus+ programme, ENACT sees the collaboration of training companies, energy agencies and professional qualification bodies coming from 4 different European countries: Italy, Portugal, Poland and Spain. The partners, under the coordination of the Italian training company AISFOR are: RENAEL (Italian Network of Energy Agencies), ADENE (Portuguese National Energy Agency), KAPE (Polish National Energy Agency), APADGE (Spanish Association on Energy Auditors) and INCOMA (Spanish training company).

In order to reach the main result of ENACT - common European based qualification system for energy auditors and the integration and development of open educational resources and definition of training resources - the activities to be developed within the 24-month project period include:

- Analysis of the training programmes and qualification frames in the ENACT countries – including an overview of the various national and regional legislation for the transposition of the European Directive on energy performance buildings, the professional qualification system, the relative compulsory (formal) training as well as the informal and non-formal training;
- Comparative analysis of the various national frames to share the common issues as well as the best practices in order to define the “ENACT Energy Auditors Competencies and Professional Profiles”;
- Definition of the learning outcomes and program for the training of the energy auditors and of the relative ECVET1 (European Credit system for vocational education and training) as well as the relative learning resources and material;
- European and National validation of the professional figure of the ENACT Energy Auditor as trained and qualified through the above-defined training and qualification process;
- Design and creation of an ENACT technology enhanced system, modules and tools to implement the above-defined training and qualification process and its overall.

1. ENACT SCENARIOS AND AIMS

The need of dynamically matching educational system offer and job market demand represents a relevant challenge to promote and sustain an inclusive and competitive society in Europe. Stimulating open, accessible and flexible education represents one of the main pillars of the Europe2020² strategy, as recalled in “Rethinking Education 2030” European strategy and in the EASI (Employment and Social Innovation)³ frame. The fulfilment of this strategic goal requires the implementation of common and shared professional profiles

1 http://ec.europa.eu/education/policy/vocational-policy/ecvet_en.htm

2 http://ec.europa.eu/europe2020/index_en.htm

3 <http://ec.europa.eu/social/main.jsp?catId=1081>

(and related competences and learning outcomes system) definition. Furthermore, the ECVET frame boosts the transparency and recognition of the learning outcomes and confirms the need to implement innovative and dynamic tools to improve employment and educational excellence.

Effectively addressing this challenge is even more critical in one of the most dynamic, wide and increasing job market area: green-jobs. It represents a very dynamic job market segment requiring new jobs and new skills. Overall, 37% of European SMEs declares to have at least one “green” person, with very different professional profiles (from energy saving to zero emission buildings) and levels (from blue collars to managers). Further the SMEs expect the “green” staff share to increase up to 39% by 2014.

ENACT (ENergy Auditors Competences, Training and profiles) addresses the skills matching challenge in the green sector, with special reference to the professional profile of the Energy Auditor.

More specifically, the project intends to positively contribute to the definition and implementation of a common frame for the green professional qualification and competence (and learning outcomes) of the Energy Efficiency Building Auditors. Skills needs anticipating and matching for this profile is very critical for the achievement of higher degrees of job market effectiveness and for the fulfilment of the recent European directive on energy efficient buildings (2012/27/UE)⁴, as well as for the Europe -20 – 20 - 20⁵ strategic goals and the NZEB⁶.

Expected impacts/results are:

- common European based qualification system for the green jobs labour market segments related to the professional figure of energy auditor to foster mobility, employability and a real learning outcomes base learning, educational and employment (and employability) strategy,
- integration and development of open educational resources and definition of training resources (and measures),
- establishment of networks and development and exchange of best practice through targeted events.

Project approach, goals and articulation (as well as its consortium composition) will also contribute to the definition of sustainable “green skills governance model” by implementing an effective dialogue, based on the direct involvement of and a co-building process among all relevant actors.

Activities will support the realization of:

- Four intellectual outputs (O1 Energy Auditors Competencies and Professional Profiles; O2 ENACT Program and Learning Resources; O3 ENACT integrated system; O4 ENACT Recommendations).
- Eight multiplier events (2 in each partner countries) and one final conference.

4 <https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive>

5 http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/targets/index_en.htm

6 Nearly Zero Energy Buildings

2. “Energy Auditors Competencies and Professional Profiles” (O1) overview and structure

The present document presents the main evidences of the first project intellectual output: O1 Energy Auditors Competencies and Professional Profiles.

The aim of this document is to report the results of the analysis and comparison of the National and European frame of the energy efficiency jobs related to ENACT and to furnish the basis to define a common professional profile (activities, competences and training) of the Energy Auditor (EA) with emphasis to the residential sector, with appropriate insight also on other activity sectors.

The output is articulated in two main interrelated sections: “Comparative Report” (O1A1) and “Energy Auditor Professional Profile(s) Matrix” (O1A2)

The **Comparative Report** (O1A1) aims to present and supply information about the qualification, certification and training system of the professional figure related to energy efficiency (energy auditors, energy managers, etc.) in each ENACT country (Italy, Poland, Portugal, Spain) in a comparable manner. The content of the Comparative Report is structured in the following main axes: institutional framework, training schemes/systems and best practices:

- **Institutional** - in terms of existing profiles and labour market dynamics, with special reference to the governance models (actors, tools and procedures), relevant for the targeted energy auditors profiles existing in the partners country. A deep and compared analysis on closed and ongoing researches and professional peer groups reports has been carried on;
- **Sectorial** - in terms of relevant emerging scenarios in the targeted job segment of auditors and in the wider green job sector in terms of skills needs, learning outcomes and professional profiles. A map of existing educational and VET curricula and training programs has also been carried on.

The Comparative Report enables to:

- have an overview of the situation in all the ENACT countries,
- identify possible areas for collaboration and/or sharing of expertise/experience regarding training of energy auditors,
- build the conceptual frame of a common (and modular) *ENACT Energy Auditor* professional profile

The **Energy Auditor Professional Profile(s) Matrix** (O1A2) reports the professional profiles (including the related skills, learning outcomes and competences) and the referentiation both at national (NQF⁷) and the European (EQF⁸) level. The matrix enables to:

- Compare the characteristics of the various energy efficient profiles,

⁷ National Qualification Frame

⁸ European Qualification Frame

- Define the national modular matrix of energy efficient profiles and the NQF referentiation,
- Identify the European *ENACT Energy Auditor* (modular) profile(s).

3. “Energy Auditors Competences and Professional Profiles” (O1) methodology and scenarios

The research and analysis activity carried out aimed at furnishing the relevant informative base to the curricula definition and the system development starting from the national and European curricula, policy and programmatic frame available. To prepare the “Energy Auditors Competences and Professional Profiles”, the partners have therefore initially analysed their National situation, through desk and on field research by collecting insight directly from the main National key actors.

The information collected from the analysis of the situation in the various ENACT countries (see Annex for the full **National reports**), has been further enriched and integrated with the results of the organic comparative analysis of scenarios, state of the art and best practices and is presented in the **Comparative Report**. The comparative analysis aimed to compare, identify and define:

- common European existing, emerging and future skills and curricula,
- challenges, governance models and labour market demand and supply actors dynamics.

According to National research and comparative analysis, the professional profiles and related skills, learning outcomes and competences have been specified and targeted in **Energy Auditor Professional Profile(s) Matrix**, including the referentiation both at national (NQF) and the European level (EQF).

The evidences collected during the National and further comparative researches, including the feedbacks from the various National stakeholders, have enabled to define a **modular structure of learning outcomes for the ENACT Energy Auditor** (illustrated in the second project output “ENACT Integrated system” O3).

The approach employed in realising the “Energy auditors Competences and Professional Profiles” has valorised the comparative analysis, best practices exchange and open coordination method thus contributing to a greater convergence and comparability across countries’ educational quality systems and across green employment strategies. Together with the learning resources sharing and development (O2 “ENACT program and learning resources”) and the validation activities (O3 “ENACT Integrated system”), will allow to define a common European frame of the professional qualification and competence (and learning outcomes) systems for the energy auditor, necessary to foster mobility, employability and a real learning outcomes base learning, educational and employment (and employability) strategy.

1. NATIONAL REPORTS METHODOLOGY: ON DESK RESEARCH AND IN FIELD MEETINGS WITH NATIONAL STAKEHOLDERS

To collect the inputs / information / insight for the “Energy Auditors Competencies and Professional Profiles” the partners have initially analysed the situation in their own countries. The National analysis have been carried out through desk research and meeting with stakeholders as described below:

1. ITALY

The following meetings have been organized:

- Accredia⁹ (the Italian National Accreditation Body appointed by the State to perform accreditation activity);
- CTI¹⁰ (The Italian Committee);
- ENEA¹¹ (the Italian National Agency for New Technologies, Energy and Sustainable Economic Development) / MESOS (Innovation training and advice),
- Formedil¹² (National Joint Association for training in the building sector) / EALP (the Energy Agency of the Province of Livorno).

The main topics discussed with Accredia and CTI were the profile of energy auditor on the basis of the new European Standard EN 16247-5 and the evaluation of its technical competence.

The main topics discussed with ENEA / MESOS concern the Build-up project BRICKS (Building Refurbishment with Increased Competence, Knowledge and Skills) and possible synergies.

The main topics discussed with FORMEDIL / EALP concern the Build up Skills project I TOWN and possible synergies in dissemination activities and organisation of common events.

2. POLAND

KAPE activities refer to the building sector (e.g. verification of building energy audits for the Polish National Economy Bank, co-operation with governmental bodies in implementation process of European EPB, ES, promotion of co-generation directives) created conditions for effective work on this report. KAPE's participation in many international projects connected with energy management in buildings (e.g. GreenLabelPurchase¹³, FINSH¹⁴, INTEREB, OPET Building, bilateral programs with Denmark and Great Britain) has built network of partners and useful experience (e.g. national associations, councils and chambers of commerce, building developers, building administrators).

⁹ <http://www.accredia.it/>

¹⁰ <http://www.cti2000.it/>

¹¹ <http://www.eanea.it/>

¹² <http://www.formedil.it/>

¹³ <https://ec.europa.eu/energy/intelligent/projects/en/projects/greenlabelspurchase>

¹⁴ <http://ec.europa.eu/energy/intelligent/projects/en/projects/finsh>

The work carried out was based almost exclusively in desk research nevertheless the consultation with cooperating companies had place. Contribution to ENACT report gave experts with length of service and experience gained in the implementation of projects and expertise on energy efficiency in construction and industry sector.

Selected realized or currently running projects KAPE:

- Report “Strategy for building refurbishment: Road Map 2050” -project cofinanced by European Climate Foundation (2012-2014)
- IEE project: Request2act, continuation of the previous project Request (above) focusing on how data from Energy Performance Certificates (EPC) can be used to promote home energy efficiency (2014-2017)
- IEE project: REQUEST –REnovation through QUality supply chains and EPC Standards (2010-2012) The aim of project was to increase the uptake of low carbon renovation measures in residential properties across all ownership tenures. It focuses on addressing one of the key barriers to action for property owners, namely easy access to a reliable quality installer or, in the case of major renovation, a range of professionals.
- (EUREM.NET) Training and network of European Energy Managers 2006-2009 aims at expanding the successful "European EnergyManager" training program EUREM to nine further EU countries. The training program developed in the EUREM (2003-2005) project is to be extended and country-specific adaptations need to take place.
- (INTEREB) INTEgrated Energy RETrofitting in Buildings 2003-2005

Some of the most relevant institutions providing information for our research and analysis include:

- Energy Auditors Association
- Energy Conservation Foundation providing trainings for energy auditors and certification of building
- Warsaw University of Technology, Institute of heat engineering providing postgraduates studies on energy audit

3. PORTUGAL

The work carried out was based almost exclusively on desk research, as ADENE is the entity responsible for the management of the national system of energy certification of buildings. Nevertheless, in the framework of the Portuguese activities and projects, ADENE had the opportunity to approach ENACT and associated objectives with relevant entities. In this context, it should be referred the interaction with the National Agency for Qualification and Vocational Training (ANQEP).

ADENE is associated partner of the FORMAR project (Vocational Training on Sustainable Buildings Maintenance and refurbishment), which is funded by Leonardo da Vinci Programme and aims to develop training resources and modules to improve the skills on sustainability issues of workers of buildings maintenance and refurbishment.

4. SPAIN

In order to adequately prepare the Spanish National Report, INCOMA has conducted some research on the European policies related to the energy field and how they are being enforced at a national level through the consultation of online information (official webpages) of such policies.

Consequently, INCOMA has also conducted some research and analysis of the applicable legislation at a national level and, where appropriate, at a European level, such as in the cases of Directives that have been transposed into the Spanish legal framework. It is also important to mention that even though the Directive 2012/27/EU has not been transposed into the Spanish legal framework, the expected impact of the legislative proposal have also been mentioned.

One important aspect to mention is the importance of regional legislation, i.e. at the level of Autonomous Communities. Legislation published at a regional level is complimentary to the national legislation and defines the aspects that must be adopted within the respective Autonomous Community.

Regarding the Spanish national qualification framework, the Spanish National Institute for Qualifications (INCUAL - Instituto Nacional de las Cualificaciones) and the Spanish National Classification of Occupations (Clasificación Nacional de Ocupaciones) have been the main sources of information regarding the professional qualifications and occupations legally defined.

Information on the training of the energy auditor is divided into 3 parts, according to the level of studies of training. Under “Higher Education” it is possible to find details on degrees provided by Higher Education Institutions in Spain that address the topic of energy efficiency. Under “Vocational Training” it is possible to find the structure legally defined for the title Superior-level Cycle on Energy Efficiency and Solar Thermal Energy (*Técnico Superior en Eficiencia Energética y Energía Solar Térmica*). In this case information at a national level (national legislation) and specificities of the Andalusian legislation is provided. Under “Private non formal training” examples of training courses that focus on acquiring skills related to energy efficiency have been included.

Some of the most relevant institutions providing information for the research and analysis include:

- ENAC (*Entidad Nacional de Acreditación*) the Spanish entity responsible for assessing technical competence in accordance with international standards;
- AENOR (*Asociación Española de Normalización y Certificación*), the Spanish Association for Standardisation and Certification;
- INCUAL (*Instituto Nacional de las Cualificaciones*), the Spanish National Institute for Qualifications;
- Ministry for Industry, Energy and Tourism, Secretary of State for Energy (national level);
- Regional Government for the Economy, Innovation and Science (regional level, Andalusia);
- IACP (*Instituto Andaluz de Cualificaciones Profesionales*), the Andalusian Institute of Professional Qualifications;
- APADGE (*Asociación Profesional Andaluza de Gestores Energéticos*), the Professional Association of Energy Managers in Andalusia.

4. European and National legislative frame

1. EUROPEAN MAIN FRAME: DIRECTIVES, INITIATIVES AND STANDARDS

Improving the energy performance of buildings is a key factor in securing the transition to a 'green' resource efficient economy and to achieving the EU Climate & Energy objectives, namely a 20% reduction in the Green House Gas (GHG) emissions by 2020 and a 20% energy savings by 2020. By reducing the energy consumption of the buildings, a direct reduction of the associated GHG emissions will be obtained and a faster and cheaper implementation of renewable energy sources will be triggered. The 2006 Energy Efficiency Action Plan identified residential and commercial buildings as being the sector with the largest cost-effective savings potential by 2020, estimated at around 27% (91Mtoe) and 30% (63Mtoe) of energy use, respectively. In addition, the Action Plan indicates that, in residential buildings, retrofitting walls and roofs insulation offer the greatest saving opportunities, while in commercial buildings, improving energy management systems is more important.

The European main frame is described below according to the European Directives, European initiatives and European Standards (EN).

1. EUROPEAN DIRECTIVES

ENERGY PERFORMANCE OF BUILDINGS DIRECTIVE (EPBD) 2002/91/EC

The 2002/91/EC Energy Performance of Buildings Directive (EPBD) is, at European level, the main policy driver affecting energy use in buildings. As originally formulated in 2002, the EPBD sets out the following key requirements for Member States:

- minimum standards on the energy performance of new buildings and large (>1000 m²) existing buildings undergoing 'major renovation';
- a general framework; for a methodology for calculating the integrated energy performance of buildings;
- energy certification for both new and existing buildings whenever they are constructed, sold or rented out;
- implement an inspection and assessment regime for air conditioning and medium and large size heating systems or, in the case of the latter, develop information campaigns on the subject.

While no full assessment of the EPBD impact has been done, it is estimated that, if fully and properly implemented, the energy savings could be as much as 96 Mtoe final energy in 2020, this being 6.5% of Europe final energy demand.

On 19 May 2010, a recast of the EPBD was adopted by the European Parliament and the Council of the European Union in order to strengthen the energy performance requirements, and the main highlights are as follows:

- As of 31 December 2020 new buildings in the EU will have to consume 'nearly zero' energy and the energy will be 'to a very large extent' from renewable sources,
- Public authorities that own or occupy a new building should set an example by building, buying or renting such 'nearly zero energy building' as of 31 December 2018,
- The nearly zero or very low amount of energy required should to a very significant level be covered by energy from renewable source, including renewable energy produced on-site or nearby,
- There is no specific target be set for the renovation of existing building, but Member States shall following the leading example of the public sector by developing policies and take measures such as targets in order to stimulate the transformation of buildings that are refurbished into very low energy buildings,
- The 1000 m² threshold for major renovation has been deleted and this will take effect when the national regulations have been implemented and applied, probably at the beginning of 2014,
- Minimum requirements for components are introduced for all replacements and renovations, although for major renovations, the holistic calculation methodology is the preferred method with performance calculations based on component requirements allowed as a complement or alternatively,
- A harmonized calculation methodology to push-up Member States minimum energy performance requirements towards a cost-optimal level is set out in the Directive in a definition and an annex, and will also be refined in a comitology process, Member States will have to justify to the European Commission if the gap between current requirements and cost optimal requirements is more than 15 %,
- A more detailed and rigorous procedure for issuing energy performance certificates will be required in Member States,
- Control systems will be required by Member States to check the correctness of performance certification,
- Member States will be required to introduce penalties for non-compliance. Member States shall lay down the rules on penalties applicable to infringements of the national provisions adopted pursuant to this Directive and shall take all measures necessary to ensure that they are implemented. The penalties provided for must be effective, proportionate and dissuasive. Member States shall communicate those provisions to the Commission.

ECO-DESIGN FOR ENERGY EFFICIENCY (ErP) 2009/125/EC

The Directive "Ecodesign of Energy-related Products Directive" (ErP) 2009/125/EC establishes a framework for the setting of Ecodesign requirements (such as energy efficiency requirements) for all energy-using products and energy-related products in the residential, tertiary and industrial sectors. The Ecodesign Directive is supplemented by the energy labelling directive. The aim of the directives is to reduce the environmental impact of products in cost-effective ways, including the energy consumption throughout the entire life cycles of the products.

- **Italy** – The Directive 2009 / 125 / CE was transposed to the Italian Legislation through the Legislative Decree February 16, 2011, that, regulates the placing on the market and putting into service of energy related products.
- **Poland** - The Commission is successively developing implementing regulations for the above Directive, containing requirements for individual groups of devices. These regulations are directly applicable in all EU Member States from the date of their entry into force.
- **Portugal** – the transposition for the national legislation is under preparation.
- **Spain** – the Directive was transposed to the national legislation through the Spanish Law nº 187/2011 of 3rd of March.

ENERGY EFFICIENCY DIRECTIVE

The 2012 Energy Efficiency Directive establishes a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all European countries are required to use energy more efficiently at all stages of the energy chain from its production to its final consumption.

European countries were required to transpose the Directive's provisions into their national laws by 5 June 2014, and for that purpose specific measures and policies should be taken, such as:

- energy distributors or retail energy sales companies have to achieve 1.5% energy savings per year through the implementation of energy efficiency measures,
- European countries can opt to achieve the same level of savings through other means such as improving the efficiency of heating systems, installing double glazed windows or insulating roofs,
- the public sector in European countries should purchase energy efficient buildings, products and services,
- every year, European governments will carry out energy efficient renovations on at least 3% of the buildings they own and occupy by floor area,
- empowering energy consumers to better manage consumption. This includes easy and free access to data on consumption through individual metering,
- national incentives for Small and Medium Enterprises (SMEs) to undergo energy audits,
- large companies will make audits of their energy consumption to help them identify ways to reduce it,
- monitoring efficiency levels in new energy generation capacities.

State of the art in ENACT countries

- **Italy** – the Directive was transposed to the national legislation through the Legislative Decree 102/2014.
- **Poland** - the Directive is not yet fully transposed, it will be implemented within the new project of energy efficiency law from 15th of April 2011

- **Portugal** – the Directive was transposed to the national legislation through the Resolution of Council of Ministers no. 20/2013, of 10 April, which approves the national action plans for energy efficiency and renewable energy sources.
- **Spain** – the Directive has not yet been transposed to the national legislation. However, there is a legislative proposal that intends to implement into the Spanish legal system.

ENERGY LABELLING DIRECTIVE

The Energy Labelling Directive 2010/30/EU (recast of 75/1992/ EC) is a framework directive designed to communicate complex information in a clear and understandable format regarding the energy consumption and performance of specified domestic appliances. It allows consumers to make informed purchasing decisions.

The directive also helps ensure a level playing field for manufacturers, while encouraging competition between them on the environmental aspects of their products. Products are ranked, according to their energy consumption, on an A to G scale with colours from dark green to red.

The implementation of the Energy Labelling Directive is linked to the Eco Design Directive (2009/125/EC): requirements and benchmarks defined for individual product group under the Eco design Directive are used as references for setting the energy labelling classes.

State of the art in ENACT countries

- **Italy** – the Directive was transposed to the national legislation through the Legislative Decree 104/2012.
- **Poland** – the legal act regulating the issues of labeling is the Act on obligations to provide information about energy consumption by the energy-using equipment dated on 14 September 2012.
- **Portugal** – the Directive was transposed to the national legislation through the Decree-law no. 63/2011 of 9 May.
- **Spain** – the Directive was transposed to the national legislation through the Spanish Law nº 1390/2011 of 14th October.

2. EUROPEAN INITIATIVES

CA RES II INITIATIVE

The CA-RES II is a structured and confidential dialogue between national authorities responsible for the implementation of the Directive 2009/28/EC or their nominated representatives. In the CA-RES II, participating countries exchange experience and best practices, participate in a cross-learning process and develop common approaches. The CA-RES II is organized around 7 core themes in the areas of support schemes for electricity, cooperation mechanisms, RES heat, electricity networks, Guarantees of Origin and disclosure, biomass mobilization and sustainability and RES in transport.

In order to meet the overall objectives, among others, it is expected that based on the experience of the participating countries, an overview of policy instruments and measures promoting the use of energy from

renewable sources will be developed, so that the participating countries can build on other successful approaches and avoid pitfalls.

BUILD-UP SKILLS INITIATIVE

BUILD UP Skills is a strategic European initiative to stimulate the training of craftspeople and other on-site workers in the building sector on the topics of energy efficiency and renewable energy. It is part of the European Commission's Energy Efficiency Plan and is funded by the Intelligent Energy Europe¹⁵ (IEE) programme. IEE is a European Union funding programme to promote energy efficiency and renewable energy in Europe. Within the Europe 2020 strategy, the objective of BUILD UP Skills is twofold:

- To identify which skills are needed among building craftspeople and on-site workers (such as installers of building equipment) to enable them to carry out the necessary renovations and new building works,
- To facilitate the planning of a national strategy for the large-scale training of building workers in Europe by 2020.

The BUILD UP Skills initiative consists of two phases. The first phase, called Pillar I, was a strategic phase and was completed between November 2011 and December 2013. The objective was to identify specific training needed by workers in each participating country and elaborate a strategy (National Roadmap.)

The second phase, Pillar II, is based on putting these National Roadmaps into practice. It facilitates the creation or improvement of qualification and training schemes. Pillar II started in November 2013.

BUILD-UP SKILLS-Portugal

In Portugal, this initiative focused on the evaluation of the workers in building sector, specifically craftsmen and installers, in terms of their skills in energy efficiency (EE) and renewable energy sources (RES). Portugal has established, as in other countries of EU, an energy policy with two action axis:

- i. increase the energy efficiency by reducing the final energy use
- ii. increase the RES share in the total primary energy.

These goals have been quantified in the revised national action plans for energy efficiency and renewable energy sources. In the other hand, the recast of the EPBD drives countries to tighten the building energy requirements and requests, by 2020, new nearly Zero-Energy Buildings. Energy goals are ambitious. Despite the building sector activity is decreasing, the workforce still does not have the appropriate skills. Therefore, training for EE and RES becomes necessary and urgent.

In this context, a roadmap had been prepared, consisting on:

¹⁵ <http://ec.europa.eu/energy/intelligent/>

- Presenting the **general strategy** for fulfilling the training needs of the building sector craftsmen or installers in order to reach the 2020 energy targets defined in the national action plans for energy efficiency and renewable energy sources;
- Pointing out the **key/priority measures** for the building sector craftsmen or installers occupations considered relevant and essential to achieve the national goals,
- Delineating the **action plan**, a set of recommendations for the action, focusing on the specific target to be trained or other structural and promotional actions.

The specific training will be targeted to the following technologies: photovoltaic, solar thermal, biomass boilers and stoves, heat pumps and shallow geothermal, windows installers, thermal insulation workers (including bricklayers), HVAC and boilers installers, lighting systems electricians, energy management and buildings operation technicians.

The action plan for the period 2014-2020 consists of a set of structural, operational and supporting measures. The main target of the operational action plan stands on the current workforce relevant for EE (energy efficiency) and RES (renewable energy sources) (70% of the total to be trained). However, requalification programs for unemployed (around 10%) are also a leading issue to be considered in the Energy Efficiency and RES training strategy. The investment cost for the set of operational measures is in the range of 20-36 million Euros.

BUILD-UP SKILLS – Italy

In Italy, the first phase of Build Up Skills concerned the definition of a Workforce for the Italian Sustainable Energy Roadmap through the identification of a national qualified training system able to improve the competences of workers needed to reach the “nearly zero emission buildings” objective. The project focused not only on the continuing education of workers in the field of buildings /blue collar, but also on the development of new training curricula aligned with the European Qualification Framework and the European Credit system for Vocational Education and Training.

BUILD UP Skills BRICKS (Building Refurbishment with Increased Competences, Knowledge and Skills) is a project of the strategic initiative BUILD UP Skills - Pillar II co-funded under Intelligent Energy Europe Program, coordinated by ENEA with a partnership of 15 national organizations and more than 40 associated partners including two Ministries, several Regions and the Autonomous Provinces.

The project lifetime is 36 months and has started in September 2014.

The project is aimed at the development of tools and methodologies to set up a training system able to improve the knowledge, skills and competences for construction workers. The increase of energy refurbishment in the building and the use of renewable energy sources will meet the objective to have almost near zero energy building stock by the 2020.

BRICKS main goal is to lay down the basis for spreading, at national level, a unique model for the certification of competences acquired through formal, informal and non-formal learning, in compliance

with the required European high quality level. Moreover, BRICKS aim is to set up new curricula to harmonize regional initiatives already taken in some Italian Regions, and a voluntary “quality label” system that provides recognition to companies employing qualified professionals.

The BRICKS main actions are:

- To promote a new national VET (Vocational and Educational Training) qualification system according to the Directives on RES (promotion of use of renewable energies sources) and EPBD (Energy Performance of Buildings Directive) by removing the barriers, which were previously identified in the Italian Roadmap,
- To adopt best practices, which were already developed and tested in European context, adapting them to the Italian system, for the assessment of the competences acquired through non formal and informal learning,
- To promote pilot actions for training the trainers and on site workers, developing a best practice for “blue collars” who hardly could be included in any formal learning process for both lack of basic knowledge and difficulties to attend courses during their working time,
- To develop a “third part certification” procedure based on UNI (Italian National Standardization body) standards, defining knowledge, skills and competences according to the European Qualification Framework,
- To provide construction workers with instruments and teaching materials, which were developed in the framework of national and/or European projects to overcome any possible gap of knowledge,
- To promote a process for obtaining a “Quality Label” for companies employing qualified personnel,
- To investigate the possibility to develop best practices exchange and a Memorandum of understanding among chambers of commerce of different countries,
- To involve all the Regions and autonomous Provinces in order to promote and disseminate the projects outcomes through their educational and vocational training system.

BUILD UP Skills I TOWN (Italian Training qualificatiOn Workforce in buildiNg) is a project of the strategic initiative BUILD UP Skills - Pillar II co-funded under Intelligent Energy Europe Program, coordinated by FORMEDIL. The project lifetime is 36 months and i has started in September 2014.

The aim of the I-TOWN project is to develop and validate training schemes at EQF level 3 for workers in the building sector, improving their competences in sustainable building, according to the Pillar I of Build Up Skills Italy initiative. Training courses will be designed balancing theory and practice, adopting the educational principle Hands on Learning. The objective will be reached through the following actions:

- Train the workers: the starting point is the national index of qualifications already agreed by the Regions and Autonomous Provinces,

- Train the trainers: a key action will consist in training professional teachers in the building sector, as stated in the Pillar I. Innovative training methodologies and technical contents will be developed on the priority areas identified and transferred to trainers throughout pilot actions to be carried out with supporting partners.

Certification and qualification of craftsmen and other on-site workers (blue collars) in the field of sustainable building. The project will set up procedures for assessing both formal and non-formal or informal learning and will establish minimum standards ensuring quality of the training process.

BUILD-UP SKILLS – Spain

In Spain, this initiative was coordinated by the LABOUR FOUNDATION FOR CONSTRUCTION and intended to establish a roadmap that would set out a clear plan of action to ensure the systems' response to the training needs arising in the field of energy performance of buildings. Its aim is to contribute to the compliance with the sustainability objectives set by the EU for 2020.

The National Plan for Energy Efficiency for the period comprised between 2011 and 2020 continues and deepens the achievements of previous National Plans and establishes some key measures, including: fostering the energetic rehabilitation of existing buildings; improving energy efficiency of existing buildings; improving energy efficiency of lightening infrastructures in existing buildings.

Despite the fact that the building sector in Spain is currently undergoing a complicated period (with a drastic decrease in activity and a decline in construction employment), 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.

Additionally, demand in the building sector would be further stimulated if some legislative gaps were addressed. Indeed, even though there are national policies and legal provisions on energy efficiency and renewable energy for the building sector, addressing the existing legislative gaps would encourage a demand stimulation that is seen as crucial to help reach the 20-20-20 targets.

According to the most important occupations in Energy Efficiency (EE) and Renewable Energy Systems (RES) with a greater need for training, the competences that would require qualifications and training are: aluminium and PVC metalwork, external enclosures, roofs insulation, partition walls insulation, DHW and air conditioning installations, plumbing installations, gas installations, electric production equipment, electrical installations and electric production.

The established roadmap has set out a total of 29 actions and 11 recommendations intended to contribute to the attainment of the objectives of the European energy targets in 2020 at different levels and areas of action.

These actions were further developed through “Construye 2020”, which is considered the second part of BUILD UP SKILLS in Spain (BUSS) and intends to implement these actions. Such actions aim at improving the education and training and the professional qualification catalogue, as well as developing training tools

and pathways that allow workers in the building sector to acquire training in energy efficiency and renewable energies, thus promoting the attainment of the objectives set for 2020.

The objectives of BUILD UP SKILLS “Construye 2020” are:

- To conduct the design of training schemes and training actions related to those occupations and professional skills which the status quo (SQ) analysis has proved the Spanish VET system nowadays lacks. These permanent training actions will allow covering these needs short-term as well as serving as a trusted base to develop professional certificates later on,
- To put into practice the training actions that have been developed, by carrying out some assessments, in which the actions will be validated from a technical and pedagogical point of view,
- To review and upgrade those existing qualifications that, as it is stated in the Status Quo analysis, need updating,
- To develop those mechanisms identified on the roadmap in order to improve the Vocational Education and Training Spanish system,
- To get the involvement of the market actors and stakeholders relevant to the topics covered in the project,
- To ensure the dissemination and communication of the BUS “Construye 2020” proposal in order to reach all key actors and target groups related to the actions proposed in the project as well as raise awareness on the necessity of undertaking energy restoration of buildings.

BUILD-UP SKILLS / Poland

The aim of the BuildupSkills Poland project (I pillar) was to develop a strategy for improving the qualifications of employees in the construction industry in the area of renewable energy sources (RES) technologies and activities enhancing the energy efficiency of buildings, so that in 2020 we are able to fulfill the aims of the climate package and Directive 2009/28/WE of the European Parliament and of the Council on the promotion of the use of energy from renewable energy sources.

Duration: 18 months (Nov 2011 – May 2013)

According to the Central Statistical Office in Poland, building sector is responsible for approximately 42% of total energy consumption in Poland, and up to 30% of this energy is consumed by the residential sector. Therefore, this sector should be more touched by activities towards energy efficiency improvement and renewable energy sources deployment. Focusing on these targets is essential from the point of view of realization of energy and climate policy. Poland had approximately 13.8 million housing units in 2005 and this amount constantly is increasing coming in 2009 to the total number of 14.3 million units. Although there are measures to improve energy efficiency in Poland in the residential sector, its energy consumption is excessive, reaching 2-3 times higher levels than in Western countries with a similar climate. Building

sector has a great potential for energy saving, and thus can contribute to achieve the 2020 European and Polish targets.

The BupS Poland Project supported meeting these targets through setting up and agreeing on the framework for the national training and qualification scheme for workers in the construction sector in the field of efficiency energy and renewable energy technologies in buildings.

Road Map “Strategy for qualification improvement for employees of the construction sector in the area of RES technologies and increasing the energy efficiency of buildings” aimed to develop guidelines for the implementation of a coherent national qualification improvement system for professionals in the construction sector in the area of energy efficiency (EE) and renewable energy sources (RES).

Action Plan assumed realization of particular tasks:

- Actions concerning continuing education in the field of energy efficiency,
- Actions regarding continuing education in the field of RES,
- Public resources essential for execution,
- Planned certification and accreditation,
- System of incentives and motivation for companies encouraging employee training,
- Structural resources for monitoring changes in the scope of qualification,
- Campaign for promoting the qualification improvement system for employees of the construction sector in the area of RES and higher energy efficiency technology in the construction industry,
- Multidirectional program for promoting energy-efficient constructing using RES as an instrument for the implementation of the strategy.

Link to road map: <http://www.buildupskills.eu/national-project/poland>

On a national level, the initiative is performed by a consortium of five partners: the coordinator – the Polish National Energy Conservation Agency (Krajowa Agencja Poszanowania Energii S.A.), the Association „Energy and environment conservation” SAPE-Poland (Ogólnokrajowe Stowarzyszenie „Poszanowanie Energii i Środowiska”), the Polish Corporation of Sanitary, Heating, Gas and Ventilation Techniques (SGGIK – Polska Korporacja Techniki Sanitarnej, Grzewczej, Gazowej i Klimatyzacji), the Warmia and Mazury Vocational Training Centre in Olsztyn (WMZDZ – Warmińsko-Mazurski Zakład Doskonalenia Zawodowego w Olsztynie) and the Institute for Renewable Energy (IEO – Instytut Energetyki Odnawialnej).

3. EUROPEAN STANDARD ON ENERGY AUDITS - EN 16247

Italy – In Italy the European standard is valid with the name UNI CEI EN 16247. All its five chapters have been published, the latest, chapter five concerning the “Competence of energy auditors” has been published in June 2015.

Poland - In Poland the European norm is valid with the name UNI CEI EN 16247. All its five chapters have been published, the latest, chapter five has been published in June 2015 in English version.

Portugal - training or other activities are not based on this norm. However, currently there is a technical committee which is integrated by ADENE and this structure is in charge for the adaptation of ISO 50002 for auditors and for the audits. Further information on the results is expected to be released soon.

Spain - The European Standard EN-16247 is currently in effect in Spain under the designation “UNE-EN 16247”.

The Spanish institution responsible for the entry into force of this standard is AENOR (*Asociación Española de Normalización y Certificación*), the Spanish Association for Standardisation and Certification.

AENOR is a private non-profit organisation created in 1986 that accredits and certifies companies and products according to international norms, such as ISO norms, in several areas of activity. Furthermore, AENOR is the institution legally responsible for the development and dissemination of technical standards in Spain.

In Spain the first 4 parts of UNE-EN 16247 were published in December 2014, part 5 (Competence of energy auditors) was published in July 2015.

Table 1 Summarising scheme on the publication of the 5 chapters of the norm UNI-EN 16247

	Italy	Portugal	Poland	Spain
1 st Chapter - general	X	X	X	X
2 nd Chapter - Buildings	X	X	X	X
3 rd Chapter – processes	X	X	X	X
4 th Chapter – transports	X	X	X	X
5 th Chapter – Competence of energy auditors	June 2015 (Italian version)	NA	June 2015 (English version)	July 2015 (Spanish version)

2. COMPARATIVE NATIONAL LEGISLATIVE FRAME

The European Union has defined energy as a strategic sector, as it is affected by climate constraints and geopolitical factors (energy dependence) and its increasing costs impact on the competitiveness of the Union as a whole. Energy is an area addressed by the Europe 2020 Strategy for sustainable growth, which intends to adapt the economies of the European Member-states and to foster the competitiveness of these countries. The European Union has namely defined as goals:

- Limiting the greenhouse gas emissions by 20%;
- Rising the usage of renewable energies to 20% of the total needs;
- Increasing energy efficiency by 20% (compared to 1990 levels).

Even though the EU has set a common policy and common goals (Europe 2020), these objectives can only be achieved through national intervention and implementation.

The main relevant institutional frame of the national energy policies for complying with the targets of the EU 2020 strategy in each partner country is as follow:

ITALY	National Energy Strategy (NES) , approved in March 2013	It focuses the efforts to a substantial improvement of the competitiveness of the energy system together with environmental sustainability. In particular, the NES <i>sets out clearly the main four goals to be pursued in the coming years</i> : <ul style="list-style-type: none"> • Significantly reduce the energy cost gap for consumers and businesses, by bringing prices and costs in line with European levels by 2020 and ensuring that the longer-term energy transition (2030-2050) will not compromise Italian and European industrial competitiveness. • Achieve and exceed the environmental and decarbonisation targets established by the European Union's 2020 Climate and Energy Package (known as the "20-20-20" package) and take on a lead role in defining and implementing the <i>Roadmap 2050</i>. • Continue to improve our security of supply, especially in the gas sector, and reduce dependency on imports. • Foster sustainable economic growth by developing the energy sector. In this context specific attention will be dedicated to the growth of all segments of the "green" economy, a sector with a huge potential that Italy needs to fully tap into. It is estimated that about €170 to 180 billion will be invested by 2020, both in white and green economy (renewables and energy efficiency), and in traditional sectors (electricity and gas networks, LNG terminals, storage facilities, hydrocarbons development). It is essentially private investment, partly supported by incentives, and with a positive economic return for the country.
	Action Plan for Energy Efficiency 2014 , approved in July 2014	Proposed by the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), it outlines energy efficiency goals that Italy has planned to achieve by 2020 as well as running policy measures for achieving them. Particular attention is given to the description of the new measures introduced by the Directive 2012/27/EC, transposed with Legislative Decree 102/2014.
	Plan for the Dissemination of Energy Efficiency (PIDEE)	The most significant measures for ENACT concern "Information programs and energy consumer education" and the need to develop an Integrated Plan for the Dissemination of Energy Efficiency (PIDEE), in close coordination with the Regions and the leading industry associations. Topics of the Plan are the activities of information and training on energy efficiency; promotion of energy audits as a useful tool to provide the information necessary for the implementation of energy efficiency measures, and planning and delivery of

	<p>awareness-raising initiatives on the workplace and of training of the Energy Manager within public authorities. Among the methods of dissemination, the provision of training on energy issues (including distance learning mode) will be promoted, together with guidelines on teaching methods and standards on training quality.</p> <p>Another significant measure concerns “the availability of schemes qualification, accreditation and certification”. Italy already has a number of certification schemes for operators and services in the field of energy efficiency, specifically for Energy Management Experts (EMGs) and ESCOs.</p> <p>The implementation of an advanced process of identification, validation and certification of skills is presented as a strategic tool of active policy against inactivity, unemployment and retraining of workers. “Build up Skills” results are shown. The initiative “BUILD UP Skills”, promoted by EACI (Executive Agency for Competitiveness & Innovation), stressed the importance of creating a system of qualification/certification of all the professionals who work in the energy efficiency of buildings to ensure the effectiveness of energy upgrading projects and hence build public trust. The initiative, which involved 30 European countries including Italy, aimed to align the Vocational training system to the skills and qualifications required in the fields of energy efficiency and renewable energy sources.</p> <p>Qualification schemes, including, where necessary, suitable training programmes, become or are available for energy managers and inspectors of heating systems in buildings.</p> <p>Another significant measure concerns energy audits and energy management systems. Following the entry into force of the new legislation, the large companies are subject to an energy audit carried out in an independent and cost-effective manner by qualified and/or accredited experts or implemented and supervised by independent authorities under national legislation by 5 December 2015; also companies with a strong energy consumption, regardless of size, must carry out an audit, which is optional for companies with high energy consumption with an energy management system ISO 50001.</p> <p>The energy audits which are carried out in an independent manner by qualified and/or accredited experts according to qualification criteria or implemented and supervised by independent authorities under national legislation.</p> <p>For the purpose of guaranteeing the high quality of the energy audits and energy management systems, after 24 months from the date of transposition of Directive 2012/27/EU, Italy has provided the certification requirement to UNI 11352 and UNI 11339 or standards to certify energy auditors, currently being drafted, for those who intend to perform energy audits.</p> <p>The decree submits to the obligation to SMEs to undergo energy audits and develop programmes to set up support schemes for SMEs, including if they have concluded voluntary agreements, to cover costs of an energy audit and of the implementation of highly cost-effective recommendations from the energy audits, if the proposed measures are implemented. This measure provides also for developing programmes to raise awareness among households about the benefits of such audits through appropriate advice services. The measure provides for training programmes for the qualification of energy auditors in order to facilitate sufficient availability of experts.</p> <p>The national energy policies for complying with the targets of the EU 2020 strategy included the implementation of national action plans on energy efficiency (PNAEE) and renewable energies (PNAER), respectively for the periods of 2013-2016 and 2013-2020. Reference also should be made to the initiatives in the field of climate change challenges, namely the national climate change programme (PNAC 2020). PNAEE and PNAER were recently revised and the Portuguese government took the decision to integrate them which will permit to proceed with a concerted action for the accomplishment of national and European targets, as well as to minimize the investment and strengthen the national competitiveness. The integrated revision of</p>
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	<p>PNAEE and PNAER is based on the alignment of respective objectives regarding the primary energy consumption and of the necessary contribution of the energy sector for the reduction of greenhouse gas emissions.</p>
PNAEE	<p>In this framework, PNAEE aims to boost the energy efficiency, mainly in the public sector, through the structural reduction of public spending and efficient use of resources. The consumption and cost reductions for business and residential sectors will grant additional resources to further domestic demand and new investments.</p> <p>For the entities and services of the Public Administration, the Portuguese Government launched an initiative targeted to the development of Energy Services Companies (ESCO's) through its Public Sector Energy Efficiency Program (ECO.AP) and the mandatory commitments of its Industry Intensive Energy Consumption Management System (SGCIE) for all industries with an annual consumption over 500 toe. The ESCO's market estimated stock value has a growing economic potential up to at least 1600 million euros by 2020 supported by the energy consumption profile for commerce, large residential buildings and industrial facilities.</p> <p>In order to achieve concrete results from the development of these Plans and associated Programmes was created a set of tools and schemes which allow evaluating and monitoring the impact of the measures implemented. One of these tools is a barometer for energy efficiency which is managed by ADENE.</p> <p>This Barometer, through a mechanism for evaluation and ranking of entities, promotes the competition between public authorities, comparing and disseminating information about the energy performance of services and bodies under direct and indirect administration of the state, through a series of indicators of energy efficiency.</p> <p>In relation to energy efficiency, the PNAER estimates a global energy saving around 8,2%, which is close to the indicative target defined by the European Union of 9% of energy saving by 2016. The contributions for the energy savings are distributed by the several sectors of activity. The present Plan covers six specific areas:</p> <ul style="list-style-type: none"> • Transport • Residential and Services • Industry • Public Administration • Behaviours • Agriculture <p>These areas include a total of 10 programmes, with a wide range of measures for energy efficiency, targeted for the energy demand and to reach the proposed objectives, which also can be quantifiable and monitored. Based on PNAER assumptions, Portuguese renewable energy target for 2020 is the 5th most ambitious of the European Union, as it aims to reduce external energy dependence and reinforce security of supply, to be positioned in the top rank of climate change initiatives and to promote economic growth.</p> <p>In 2013 over 57% of electricity consumption was generated through renewable energy sources and the Portuguese government is fully committed to continue its renewable growth. Within the new Renewable Energy Strategic Plan (PNAER), the defined target is to increase the capacity of renewable energy on around more 5 GW by 2020.</p> <p>In the other hand, the PNAER forecast that the quota of electricity from renewables will be higher by 2020 compared with the figure by 2010 (60% vs 55%), as well as the global target to reach that will be about 35% (before was 31%). In this frame, PNAER establish the focus in three big sectors:</p> <ul style="list-style-type: none"> • Heating and cooling • Electricity • Transport

		The establishment of this 2020 time frame for the monitoring of the estimated impact on primary energy consumption, allows to forecast, in advance, the accomplishment of the new targets set by the EU of 20% reduction of primary energy consumption by 2020, as well as the overall goal above mentioned of reduction in primary energy consumption by 25% and the specific objective for Public Administration of 30% reduction. In general, it is expected a favourable evolution of the global goal of the contribution of renewables for the horizon 2013 -2020.
	PNAC	The national climate change programme for the period 2013-2020 (PNAC 2020) is an ongoing initiative that should define policies, measures and instruments aiming to respond to the mitigation of greenhouse gas emissions for sectors not covered by the European Union Emission Trade Scheme. In this frame, reference to the Portuguese Carbon Fund created in 2006, which is a Portuguese state financial instrument for acting on the carbon market to ensure compliance with national targets on climate change issues, making use of the flexibility of the Kyoto Protocol and supporting national projects to reduce emissions and contributing to improve energy efficiency.
	Coalition for Green Growth	<p>The Green Growth Coalition was founded in February 2014 and it combines the efforts of almost 100 associations, representatives of the business, science and financial sectors, public bodies, foundations and NGOs.</p> <p>The Green Growth Commitment wishes to lay the foundations for a commitment to policies, goals and targets that foster a development model that will reconcile essential economic growth with lower consumption of natural resources and social justice and quality of life for the population.</p> <p>The GGC sets 13 quantified goals for 2020 and 2030, and regarding green economy/jobs, energy efficiency and renewables it is forecasted to:</p> <ul style="list-style-type: none"> • increase green exports - 500 million euros in 2012, to 700 million euros in 2020 and 1200 million euros in 2030. • create green jobs - 70000 people in 2012, to 95000 people in 2020 and 140000 people in 2030. • improve energy efficiency by decreasing the energy intensity - 129 toe/M € GDP in 2012 to 134 toe/M € GDP in 2020 and 107 toe/M € GDP in 2030. • increase share of renewable energy 24,6% of final energy consumption in 2012, to 31% in 2020 and 40% in 2030.
SPAIN		<p>Spain has set up a National Plan for Energy Efficiency for the period comprised between 2011 and 2020[1] that continues and deepens the achievements of previous National Plans and establishes some key measures:</p> <ol style="list-style-type: none"> 1) Increasing railway as a means of transport; 2) Fostering the energetic rehabilitation of existing buildings; 3) Improving energy efficiency of existing buildings; 4) Setting up plans for transporting employees; 5) Setting up plans of sustainable mobility in urban areas; 6) Improving energy efficiency of lightening infrastructures in existing buildings; 7) Improving technology equipment and processes; 8) Updating existing streetlight infrastructures; 9) Fostering cogeneration stations in non-industrial activities; 10) Energy auditing and action plans in farms. <p>Some important aspects were taken into consideration while preparing this National and setting new goals:</p>

	<p>Spain has improved its energy consumption, but it is still 15% above the EU15 average;</p> <p>Spain has the same per capita electricity consumption as the UK (but a lower income and more hours of light) and a higher per capita energy consumption than Italy (a country with similar weather and economic conditions);</p> <p>Spanish citizens consider that there is plenty of energy waste (85%) and that they have the capability of improving the energy savings (86%).</p> <p>The Spanish National Plan for Energy Efficiency will have a cost of almost 46 million euros. However, savings are estimated to rise up to almost 79 million euros, placing the net benefits of these measures in less than 38 million euros.</p> <p>The international norm ISO 50001:2011 is applicable in Spain to all organisations intending to certify energy management systems in regards to energy performance. It specifies the requirements for establishing, implementing, maintaining and improving an energy management system and aims to help organisations continually reduce their energy use, and therefore their energy costs and their greenhouse gas emissions.</p> <p>Released in 2011, this norm is applicable to any organisation, regardless of its size and geographic location and sets a framework of requirements based on the approach “plan – do – check – act”.</p> <p>The importance of energy efficiency stresses the need and the increasing demand for trained and accredited professionals to certify energy management systems. Whereas some organisations already contemplated the figure of a professional that was responsible for quality and environmental questions, the figure of a new professional, the energy manager, is making its way into the national panorama and organisations.</p> <p>These professionals’ career prospects include:</p> <ul style="list-style-type: none"> • Green jobs; • Sustainable building/construction; • Building energy certification assistant; • Solar installation sales; • Assembling and maintaining solar thermal installations; • Promotion of energy efficiency programs. <p>In Spain, one can find a multitude of companies providing services in the area of energy (ESE - <i>Empresa de servicios energeticos</i>).</p> <p>According to the Directive 2006/32/EC, energy services companies are “a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria”. These companies focus on energy savings, which translates in reducing costs with energy and reducing CO2 emissions. This is achieved through designing and implementing projects that ensure an efficient management of energy.</p>
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Poland	Energy Policy of Poland until 2030	<p>In Poland, the strategic document describing national energy development is the Energy Policy of Poland until 2030, approved in 2009. Regarding energy efficiency (EE) and renewable energy sources (RES), the essential tasks for the construction sector defined in this document are:</p> <ul style="list-style-type: none"> • striving towards maintaining a zero energy economic growth, i.e. economic development without an increase in the demand for primary energy, • consistently decreasing the energy consumption of Polish economy to the EU-15 level, • increasing the share of renewable energy sources in the final energy consumption to minimum 15% in 2020 and a further increase of this indicator in the following years. <p>the execution of main goals will be achieved thanks to:</p> <ul style="list-style-type: none"> • increasing the efficiency of electric energy production by building high-efficiency production units, • doubling (in comparison with 2006) electric energy production from high-efficiency cogeneration technology by 2020, • decreasing the indicator of network losses in the process of transfer and distribution by, • among others, modernizing current and building new networks, exchanging low-efficiency transformers, as well as developing distributed power generation, • the growth of energy end-use efficiency, • increasing the relation between annual electric energy demand and maximum power demand during peak load times, which will allow reducing the total cost of satisfying the demand for electric energy. <p>Energy Policy of Poland until 2050 is under preparation and should be publish in the end of 2050.</p>
		<p>According to article 9 paragraph 1 the re-cast Energy performance Building Directives (EPBD) the National plan increasing the number of nearly zero energy buildings was published on the 2nd of June 2015.</p> <p>The NZEB study is designed to lead to:</p> <ul style="list-style-type: none"> • a common understanding of the issue around nearly zero energy buildings; • knowledge on possible solutions to pending questions; • proposals for suitable definitions; • a clear view on the effects of such definitions; • a comparison of the results and recommendations for the steps towards common understanding of this term throughout Europe.
	NAPEE	<p>Second document defining the requirements in the area of energy efficiency of buildings is the National Action Plan on energy efficiency. This document is prepared in accordance with the reporting obligations to the European Commission on the basis of Directive 2006/32 / EC (Acts. Office. L 114, 27.04.2006, p. 64) and the Directive on Energy Performance Buildings 2010/31 / EC (OJ . Office. L 153, 18.06.2010, p. 13). This document has also pursuant to Art. 6 paragraph. 1 of the Energy Efficiency Act from 15 April 2011. (Dz. U. No. 94, item. 551), implementing the Directive 2006/32 / EC.</p> <p>Accordance with Art. 4 of Directive 2012/27 / EU the Third National Action Plan adopted in 2014 was supplemented with the National Strategy for Building Renovation.</p> <p>This strategy is called "Supporting investments in modernization of buildings", and it was developed by the Ministry of Infrastructure and Development.</p> <p>This document fits in with the objectives of the leading strategy of "Europe2020" and the objectives defined in the National Reform Programme for Poland: Reducing primary energy consumption to around 96 mtoe. Increasing the use of renewable energy sources, reduction of CO2 emissions.</p>

5. European and National qualification framework

1. EUROPEAN FRAME

Stimulating open, accessible and flexible job market systems represent one of the main pillars of the European strategy for sustainable, inclusive and competitive growth, as confirmed by the relevant European programs and initiatives (EaSI programmatic frame, Rethinking Education 2030, Toward a job rich economy, New Skills for New Jobs, Erasmus Plus and so on) and by the same EQF and ECVET systems, that boosts the transparency and recognition of the learning outcomes and confirm the need to implement innovative and dynamic tools to improve employment and employability.

Effectively addressing this challenge is even more critical in one of the most dynamic, wide and increasing job market area: green-jobs.

The complexity and the potentials of effectively dealing with these challenges are organically addressed in “Exploiting the Employment Potential of green growth” (EC, 2012b), as well as in the CEDEFOP sectoral report (2012), in the research resources of the mutual learning program on “pathways to green jobs” (EC 2013). Last, but not least, the recent EEO Review offer an extensive review of comparative evidences and emerging indications related to green employment promotion strategies (EEO, 2010; 2013).

The European Union’s new strategy for sustainable growth and jobs (EU2020), puts innovation and green growth at the heart of its blueprint for competitiveness. Europe suffers from systemic weaknesses in its skills base which limit its productivity and competitiveness in today’s economy, and reduce its capacity to exploit the opportunities offered by green growth. These deficits in management skills and technical job-specific skills are a greater concern than shortages of new green skills (Cedefop, 2012; EC, 2012a, b; EC, 2013a, b; EEO 2013).

Green Jobs represent a very dynamic job market segment requiring new jobs and new skills. By 2030 Europe will need more than 400 thousand workers in the renewable energy industry. In Italy, where SMEs with at least a green job should be 51% of the total in 2014, a proportion slightly lower the current one (55%) but well above the EU average (39%) (EC, 2012a, b; EC, 2013a, b). For the Italian context, the last GreenItaly (2013) report, based on a large survey on a representative sample of firms (more than 100,000), 23.9% of Italian firms invested in green products and technologies (I.e. energy saving and/or reduced environmental impact products and technologies) in the 2008-2011 period. Eco-changes are also relevant for Poland. In the EU's climate and energy package, it is assumed that by 2020 15% of the energy in Poland must come from renewable sources, and about 20% must be reduced the domestic emissions of carbon monoxide. As enumerated Greenpeace Poland, until 2030 in Poland will be almost 190 thousand "green jobs" available in all green sectors.

These data highlight the relevant employment potential of the green growth in many European country and, consequently, the need of improving, enriching and widening the educational and VET system resources to

effectively respond to these skills needs. Difficulties in finding adequate competences is reported for 30.3% of green hiring in strict sense, compared to 28.1% of green hiring in wide sense (traditional professions with a green content) and 24.2% of non-green hiring. This points at the need of adequate training strategies to provide candidates with the skills required by the market; it also highlights another relevant scenario dimension: the lack of a common skill/competences certification system.

These challenges are even more urgent considering the parallel need to properly address, both at national, EU and international level, a common and clear definition of the concepts of 'green sector' and 'green employment'. Defining green jobs can involve a number of dimensions: sectoral, skill-based (the extent to which the job demands 'green' skills); skill novelty (EC, 2013a; Cedefop, 2012). Traditional statistics do not allow the identification of a green sector and the corresponding green workers (as well as their characteristics, wage levels, etc.). There are a number of different interpretations on the definition of green job which vary according to whether they are strictly defined within the environmental sectors, and how many and how new the 'green' skills are which they demand (ILO, 2008, 2011; EC, 2013a, 2013b; Cedefop, 2012; OECD, 2012). Recent publications from the European Commission divide types of employment into those in 'eco-industries' (jobs are green because products or services are green) and 'transformation' industries (all jobs will become greener) (EC, 2013a; EEO Review, 2013). The demand for green skills in fact has also the potential to change the content of existing jobs (EC, 2013a).

Green jobs represent a very wide and diversified job market area in terms of segments (from energy saving to zero emission buildings), of professional profiles and levels (from blue collars to managers). As above stated, the difficulties in defining clear and common boundaries of the green jobs represent a serious shortcoming since the absence of a common definition makes it difficult to carry out comparative analyses and promote effective educational and employment strategies.

In order to overcome these critical issues and to contribute to a common European based curricula and profiles, ENACT will employ:

- EUROPEAN QUALIFICATION FRAMEWORK (EQF)
- NATIONAL QUALIFICATION FRAMEWORK (NQF)
- ECVET

methodologies, approaches and tools.

1. EUROPEAN QUALIFICATION FRAMEWORK (EQF)

The European Qualification Framework (EQF) uses 8 reference levels based on learning outcomes (defined in terms of knowledge, skills and competences). The EQF shifts the focus from input (lengths of a learning experience, type of institution) to what a person holding a particular qualification actually knows and is able to do. By shifting the focus to learning outcomes it helps to:

- Support a better match between the needs of the labour market (for knowledge, skills and competences) and education and training provision,

- Facilitate the validation of non-formal and informal learning,
- Facilitate the transfer and use of qualifications across different countries and education and training systems,
- Transfer units of learning outcome, based on a credit system (ECVET).

It also recognizes that Europe's Education systems are so diverse that comparisons based on inputs, such as a length of study, are impracticable.

Each of the 8 levels is defined by a set of descriptors indicating the learning outcomes relevant to qualifications at that level in any system of qualifications. In the context of EQF:

- knowledge is described as theoretical and/or factual,
- skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments),
- competence is described in terms of responsibility and autonomy.

Level 1 - The learning outcomes relevant to Level 1 are basic general knowledge:

- basic skills required to carry out simple tasks,
- work or study under direct supervision in a structured context.

Level 2 - The learning outcomes relevant to Level 2 are:

- basic factual knowledge of a field of work or study,
- basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools,
- work or study under supervision with some autonomy.

Level 3 - The learning outcomes relevant to Level 3 are:

- knowledge of facts, principles, processes and general concepts, in a field of work or study,
- a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information,
- take responsibility for completion of tasks in work or study,
- adapt own behaviour to circumstances in solving problems.

Level 4 - The learning outcomes relevant to Level 4 are:

- factual and theoretical knowledge in broad contexts within a field of work or study,
- a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study,
- exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change,

- supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities.

Level 5 - The learning outcomes relevant to Level 5 are:

- comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge,
- a comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems,
- exercise management and supervision in contexts of work or study activities where there is unpredictable change,
- review and develop performance of self and others.

Level 6 - The learning outcomes relevant to Level 6 are:

- advanced knowledge of a field of work or study, involving a critical understanding of theories and principles,
- advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study,
- manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts,
- take responsibility for managing professional development of individuals and groups.

Level 7 - The learning outcomes relevant to Level 7 are;

- highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research,
- critical awareness of knowledge issues in a field and at the interface between different fields,
- specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields,
- manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches,
- take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.

Level 8 - The learning outcomes relevant to Level 8 are:

- knowledge at the most advanced frontier of a field of work or study and at the interface between fields,
- the most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice,

- demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research.

2. NATIONAL QUALIFICATION FRAME (NQF)

The NQF are described in the O1 dedicated section with partners information

3. ECVET

The ECVET system aims at allowing the transfer, recognition and accumulation of learning outcomes to obtain a qualification. It must give European Union citizens the possibility to obtain professional qualifications through personal learning outcomes, regardless of the country or educational system.

ECVET is:

- a decentralized system relying on volunteer participation of Member States and stakeholders of vocational training, respecting national legislations and regulations,
- a methodological framework for describing qualifications in terms of learning outcomes using units, allowing to allocate transferable points for Member States with different education and qualification frameworks,
- based on granted partner agreements regarding qualification transparency and mutual stakeholder trust.

The ECVET methodology includes inseparable provisions:

- the description of qualifications in terms of learning outcomes (knowledge, aptitudes and skills) organized in learning outcome units which may be transferred, validated and accumulated,
- the existence of a transfer process for learning outcomes including assessment, validation, recognition and accumulation of learning outcomes,
- using a point system assigned to learning outcome qualifications and units.

ECVET's effectiveness in regards to mobility, and maintaining a winning approach

- relies on the mutual trust between the various partners: competent certification authorities, training service providers, etc.,
- requires the involved partners to fully understand the ECVET technical aspects,
- asks partners to willingly accept the ECVET principles in the qualification design and adaptation and their awarding procedures for recognition of learning outcomes of people benefiting from mobility.

Implementing the ECVET credit system implies a significant partnership dimension:

- to function efficiently and thoroughly for all individuals, ECVET requires solid, active and long-lasting partnerships between the institutions and competent vocational qualification authorities and the organisations responsible for vocational training,
- to design projects with shared or common planning and design for the different VET engineering, implies a coordination of institutions and organisations involved in the technical, scientific and organisational aspects.

As ECVET is intended to encourage and valorise mobility, it is necessary to anticipate and establish links between planning and design actions and the programmes and activities directly devoted to the mobility of people in their learning pathways, especially within the framework of community programmes.

2. COMPARATIVE NATIONAL QUALIFICATION FRAMEWORK

This section reports the main legislative frame and the relevant qualification framework.

1. ITALY

The figure of energy Auditor has been introduced by the legislation with the Legislative Decree 102/2014. In article 2, the energy auditor is defined as “natural or legal person that performs energy audits”. Energy audit means a systematic procedure with the purpose of obtaining adequate knowledge of the existing energy consumption profile of a building or group of buildings, an industrial or commercial operation or installation or a private or public service, identifying and quantifying cost-effective energy savings opportunities, and reporting the findings. However, the definition of the competencies, skills and training that energy auditor must have, is still under development.

Concerning certification issued under accreditation, the Article 8 of the Legislative Decree n. 102 of 4th July 2014 provides that energy audits of industrial facilities must be performed by ESCO or experts in energy management or energy auditor, all certified by accredited bodies.

The Italian standard certification for Energy Auditor is under elaboration by UNI-CEI.

The legislative Italian framework sees the existence of four main energy profiles that can be of interest for the project ENACT: the energy manager, the expert in energy management, the energy certifier and the inspector of heating systems.

The National report analyses deeply the existing energy profiles.

PROFILE	LEGISLATIVE FRAME	Standard certification and accreditation
ENERGY MANAGER (EM)	The law 308/82 established the obligation for all industrial enterprises with a consumption over 10.000 toe/year and with over 1.000 employees to appoint a person “in charge for the	

	<p>rational use of energy". After nine years, article 19 of Law 10/1991 extended the mandatory appointment of the energy manager to large energy consumers in the civil and transport sectors.</p> <p>The energy manager deals with the analysis of energy flows, promotes energy efficiency measures and supports the top management and the policy makers (in the Public Administration) to pursue a sustainable development. The threshold is set in 10.000 toe/year for all subjects operating in the industrial, civil and tertiary sectors users and in 1.000 toe/year for remaining sectors (e.g. public administration).</p> <p>The appointed Energy Manager can be an employee of the company subject to the obligation or a consultant. The second approach is particularly useful for medium size companies and for small Local Authorities, which does not reach an energy bill capable to justify the hiring of dedicated employees.</p> <p>In recent years new tasks and opportunities are added by the legislation to the EM to:</p> <ul style="list-style-type: none"> • check and approve the energy efficiency certifications for new and refurbished public buildings (the Legislative Decree no. 192/2005). • participate directly to the White Certificate scheme (Ministerial Decree 21/12/2007). • be counterpart in the energy service contracts for public bodies (Legislative Decree 115/2008, transposition of the directive 2006/32/EC on energy services). <p>As regards the background of the energy manager is usually based on university degree (especially energy engineering), eventually integrated by master dedicated to energy efficiency and renewables and/or training. It is also very important to update the professional profile, so there are several initiatives at national level, such as courses on general or specific topics organized by ENEA and FIRE.</p>	
EXPERT IN ENERGY MANAGEMENT (EEM)	The expert in energy management (EEM) is a professional profile modern and interdisciplinary, who works in the context of the new European energy market. This figure combines the technical	Experts in energy management:

	<p>expertise with a solid expertise in environmental matters, business management and communication. The skills profile for the expert in energy management has been developed taking into account the results of the Project e-Quem (e-Qualification of the Energy Manager), that was launched in 2007 in the Equal Program.</p> <p>The energy manager expert is certifiable according to UNI CEI 11339 standard.</p> <p>In order to pass the certification process EMEs must have appropriate qualifications and pass an examination.</p>	<ul style="list-style-type: none"> • Italian standard certification - UNI CEI 11339; • Accreditation standard - UNI CEI EN ISO / IEC 17024. • Up to 31 August 2014, 245 professionals are certified by 4 Accredited bodies.
HEATING SYSTEM INSPECTOR	<p>The figure of the heating system inspector is related to Legislative Decree 192/05 and subsequent amendments. According to the latest additions, the scope of the check, renamed an “inspection” now also includes a consultancy on possible cost-effective projects to improve the system’s performance.</p> <p>The requirements for inspectors are listed in Annex C to Presidential Decree No 74/2013. In greater detail, inspectors must possess “baseline technical and vocational training meeting at least the requirements of Article 4(1)(a) and (b) of Ministerial Decree No 37/08” i.e. a university technical degree or a high school technical diploma plus two years’ relevant work experience.</p>	
ENERGY CERTIFICATION ASSESSOR (or ENERGY CERTIFIER)	<p>The Energy Certification Assessor is a technician able to perform an energy audit of the building. He collects data on the building, processes them according to the procedures and determines the energy requirements. He can issue the Energy Performance Certification.</p> <p>The figure of energy certifier was introduced by the Legislative Decree 192/2005 and subsequent amendments.</p> <p>The Presidential Decree No 75 of April 16th 2013 lays down the professional requirements and accreditation criteria to ensure the qualification and independence of the experts and bodies to be tasked with the energy certification of buildings.</p>	<p>Energy Certifier:</p> <p>Standard certification - exclusive scheme</p> <p>Accreditation standard - UNI CEI EN ISO / IEC 17024.</p> <p>Only SACERT is accredited.</p>

	<p>The qualified technicians are divided into two categories:</p> <p>Technicians that have degrees (i.e. Electrical engineering, architecture, environmental sciences,...) and high school diplomas (i.e. technological subjects) in specific fields. The technician must also be registered with the relevant professional associations (where existing) and qualified to practice the design of buildings and building plants.</p> <p>Technicians that have degrees/high school diplomas in other fields, but that need to attend a specific training course for energy certifiers.</p> <p>The Decree provides for training courses for professional qualification to be held at national level by universities, research bodies and agencies and professional bodies and councils authorised by the Ministry of Economic Development and at regional level by the Regions and Autonomous Provinces, or by other regional-level authorised bodies. The Decree also sets out the minimum contents of the courses.</p> <p>The decree "Italy destination" modified by the law February 21st, 2014, increases the number of degrees and diplomas that don't need additional training. Moreover the duration of training courses must be at least of 80 hours (instead of 64 of the previous decree).</p>	
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2. POLAND

National qualification system and Integrated System of Qualifications are still under development. Polish Qualifications Framework (PRK), just as the European Qualifications Framework (EQF), consists of eight levels of qualifications.

Relevant profiles in the field of energy efficiency on the Polish market are reported in the following matrix.

	Profile	Legislative frame and requirements
ENERGY AUDITOR	Must be able to perform the energy audit according to Regulation of the Minister of Infrastructure of 17 March 2009 (Dz. U. 43, pos. 346) on the form and	The energy auditor does not have entitlements specified by law. Profession started to function in 90's for the implementation support system for initiatives aimed at improving energy efficiency in municipal and household sector introduced by the Act on Support for Thermal

	<p>content of energy audits and renovations.</p> <p>A professional that preparing and defining the scope of technical and economic parameters for thermo-modernization project in buildings, indicating the optimal solution in terms of its cost and energy savings</p>	<p>Refurbishment and Renovations (Dz.U 162/98, poz.1121) in 1999.</p> <p>Still-functioning system is intended to facilitate the financing of thermomodernization or renovation in order to achieve a reduction in energy consumption, in particular the cost of heating and domestic hot water (DHW). The groundwork of support system is an Energy audit of building. Currently, in force is the Act on Thermal Refurbishment and Renovations (Dz. U. No. 223, item. 1459), together with the amendment dated 5.03.2010 (Dz. U. Nr. 76, pos. 493), which entered into force on 19 March 2009.</p> <p>The Act have not specified requirements for persons who carry out the audit, audit quality provide specific regulations which carried out detailed requirements for audit and its verification.</p> <p>Audit requirements are determined in the current Regulation of the Minister of Infrastructure of 17 March 2009 (Dz. U. 43, pos. 346) on the form and content of energy audits and renovations.</p> <p>In accordance with the provisions of this act, an energy audit is the foundation for the construction project.</p> <p>The Polish National Energy Conservation Agency - KAPE already in 1996 took part in the project "Energy consultancy scheme for buildings" developed under the Polish-Danish governmental programme granted by the Danish Energy Agency. Within the framework of the project trained 12 building energy auditing trainer were educated by DTI in Denmark who developed a training curriculum and set up basis for building energy consultancy scheme in Poland. Since then, more as 4500 professionals have been trained under this voluntary scheme.</p> <p>Requirements the person with master diploma, in private trainings the experience.</p>
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<p>ENERGY EFFICIENCY AUDITOR</p>	<p>Must be able to provide energy efficiency audit according to Energy Efficiency Act dated on 15 April 2011.</p> <p>Professional that preparing analysis of energy consumption, and specifying technical condition of the object, a technical device or installation (including industrial), including a list of projects for improving energy efficiency of this objects, equipment and installation, as well as an assessment of their cost-effectiveness and possible energy savings achievements.</p> <p>Energy Efficiency Auditor is usually concentrated on the industrial installations and objects.</p> <p>Energy efficiency auditor possesses the knowledge and skills to analyse energy efficiency in a transversal way (energy efficiency in buildings, installations, industrial processes) from identification to preparation and implementation of projects.</p>	<p>Energy Efficiency Act dated on 15 April 2011 introduces “white certificates”, which is the support system for the pro-efficiency investments, for which you will need to prove achieving of the assumed energy savings. To prove for savings, it will be necessary perform an energy audit of the input, allowing you to specify the expected savings and another one after the pro-efficiency investments - verification audit.</p> <p>Originally energy efficiency audits (initial / verifying) could be carried out by a qualified auditor, according to the provisions of the Energy Efficiency Act.</p> <p>However, Profession has been deregulated, the amendment to the Energy Efficiency Act in October 2012, repealed Article. 29, talking about the person preparing the audit requirements of energy efficiency.</p> <p>The new regulations aimed to increase access to the profession, and as a result lead to increase competition in the market and higher availability to the services.</p> <p>The quality of the audit ensure Regulation of the Minister of Economy of 10 August 2012 on the detailed scope and method of preparation of the energy efficiency audit, model form of audit and the methods for calculating energy savings Dz.U. 2012 nr 0 poz. 962</p>
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ENERGY CERTIFIER	a professional to prepare energy performance certificates for buildings	<p>Energy certifier was created in September 2007 within the amendments to the Construction Law - dated September 19, 2007 (Dz. U. Nr. 191, pos. 1373), and another amendment - dated August 27, 2009 (Journal of Laws No. 161, item. 1279) introducing the necessary corrections and additions. It was 3 years delay transposition of the Directive 2010/31/ EU from 19 May 2010 on the Energy Performance of Buildings in Poland.</p> <p>Originally energy performance certificates could be carried out by a qualified auditor, according to the provisions of the Construction Law.</p> <p>However, Profession also was deregulated.</p> <p>Announced on 8 September 2014 Act on Energy Performance of Buildings (Dz.U. 2014 poz. 1200), it entered into force in March of 2015 and defines the:</p> <ul style="list-style-type: none"> • rules for preparing the energy performance certificates ; • competences of person entitled to prepare certificates • rules of controlling heating and air conditioning system in buildings; • rules of managing central register of the energy performance of buildings; • how to develop a national action plan aimed at increasing the number of buildings with low energy consumption <p>Previously a person preparing the energy performance of the building must have a university degree and the Building Construction entitlements or complete training /postgraduates studies and pass an exam at the Ministry of Infrastructure. The new law specifies that a person preparing the energy performance certificates will be able to meet only one of the requirements:</p>
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		<ul style="list-style-type: none"> • have an engineer or Master of Science title • complete the other higher studies and postgraduate studies, which the program takes into account issues related to the energy efficiency of buildings, performing energy audits of buildings, construction energy saving and renewable energy sources • have the building qualification, referred to in Art. 14 paragraph 1 of the Act of 7 July 1994 - Construction Law. <p>Thus, it will be impossible to obtain entitlements through training and passing the examination at the central level.</p>
RES INSTALLER	<p>A professional that install the following types of renewable energy sources:</p> <ul style="list-style-type: none"> • boilers and biomass stoves or • photovoltaic systems, or • solar heating systems, or • heat pumps, or shallow geothermal systems 	<p>The Directive of the European Parliament and Council Directive 2009/28 / EC of 23 April 2009 on the promotion of the use of energy from renewable sources provides a system of certification of installers RES, as well as accreditation of training centers of installers. Implementation of the provisions of Directive 2009/28 / EC into Polish law was by amending the Act of 10 April 1997- Energy Law (Dz.U. 2012. Poz 1059 - jt). Amendment of Energy Law came into life in September 2013.</p> <p>According to this law the Office of Technical Inspection accredits training providers and certification of installers of micro and small installations of the following types of renewable energy sources:</p> <ul style="list-style-type: none"> • boilers and furnaces for biomass, or photovoltaic systems, or solar heating systems, or heat pumps, or shallow geothermal systems. <p>Detailed regulations for certification and accreditation of installers and training providers are contained in the following Regulations, issued on the basis Art. 20v w / in the Act:</p> <p>* Regulation of the Minister of Economy of 25 March 2014. On the conditions and procedures for issuing certificates</p>

		<p>and accreditation of training providers in the field of renewable energy sources (Dz.U.2014. Poz. 505)</p> <p>* Regulation of the Minister of Economy of 20 March 2014. On charges for carrying out the examination, issuance and renewal of a certificate and for granting accreditation in the field of renewable energy sources (Dz.U. 2014. Poz. 425).</p> <p>The certificate for installers is issued for 5 years. The validity of the certificate will be extended for a further period of five years, upon fulfilment of certain requirements.</p> <p>In order to issue a certificate of renewable energy installer, the installer must meet a number of requirements. These requirements are separated into two groups:</p> <ul style="list-style-type: none"> • installers who have vocational education in the field of renewable energy equipment or higher education related, • installers who have completed training in an accredited training centre and passed a test
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There are two energy professions defined in Regulation of the Minister of Labour and Social Policy dated on 07.08.2014 on the classification of professions and specializations for the needs of the labour market and its scope. Regulation came into life in the beginning of 2015.

214901 Energy Auditor the national standard is not yet developed but it will cover the energy auditor profession

214932 Energy Manager possess wider competences which are similar to the energy efficiency auditor professional competences but Energy Manager is an engineering profession in the field of managing the usage of energy resources in one specified organization (public or private company, municipality).

Only for the Energy Manager profile national standard of professional competence was developed. It says that competences needed to perform tasks in the profession suggests to use to describe qualifications at level 7 right for the second higher education degree in European and Polish Qualification Framework. This level is a legitimate place for the location of the profession in the draft Classification of professions and specializations of 2013. (Major group 2 and its counterpart in ISCED 2011).

The person who is energy manager:

1. in terms of knowledge: know in depth way the specified concept, facts, theories, methods, and complex dependencies and conditions between them, also in conjunction with other fields, used

in the profession manager of energy and has a diverse knowledge to adapt procedures, standards and regulations to the implementation of an energy management system tasks. He knows the ways of overcoming the limitations of characteristics, equipment and processes and the general principles of management, analysis, planning and evaluation;

2. skills: able to carry out the task and formulate and solve problems using new knowledge also from other fields (environmental protection), can independently diagnose, plan, execute, test and implement improvements in energy efficiency can communicate with diverse the circle of recipients and properly justify positions in the area of improving awareness and behavior of pro-effective and environmentally friendly.

The RES Installers can start education at the VET level from 2011 when Regulation on core curricula (DzU nr 100/2011, poz. 582) introduced technician of renewable energy equipment and systems_311930

Profession of a technician of renewable energy equipment and systems, reference number 311930, where the following qualifications have been separated B.21. Installation of renewable energy equipment and systems and B.22. Operation of renewable energy equipment and systems, has ability to:

- use documentation, standards and installation instructions, estimate guides, catalogues of materials, equipment and elements of installations used in renewable energy systems,
- prepare proposals, calculations and estimates for the installation of renewable energy equipment and systems,
- plan and organise the installation and operation of renewable energy equipment and systems,
- install, assemble, disassemble, repair, maintain and perform current and periodic inspections of renewable energy equipment and systems,
- activate renewable energy equipment and systems,
- control the parameters of renewable energy equipment and systems,
- use computer programs supporting the performance of tasks,
- apply the rules of the construction law and energy law,
- conduct rational energy management, and, in addition, within the scope of professional tasks performed:
- observe occupational health and safety, fire and environmental protection regulations and the requirements of ergonomics,
- provide first aid to the injured in accidents at work and in life or health-threatening situations,
- apply the provisions concerning business operation, labour law and personal data protection law,
- use a foreign language and use foreign-language sources of information,
- organise work of a small team.

3. PORTUGAL

In the table below are identified and characterised the existent categories of energy auditors/energy managers.

<p>Expert on energy certification of buildings</p>	<p>The qualification of expert on energy certification of buildings proceeds from the transposition to the national legislation of Energy Performance Buildings Directive (Directive 2010/31/UE), from which was published the following legislation:</p> <p>Decree-Law n.º 118/2013, of 20 August, that integrates 3 regulations:</p> <p>System of energy certification of buildings (SCE) – defines the management and duties of all agents involved in the application of building legislation.</p> <p>Regulation of HVAC systems (RECS)- sets out a series of requirements applicable to services and residential buildings equipped with HVAC systems, which, in addition to defining the quality of the envelope and restricting energy consumption, also regulate the efficiency and maintenance of HVAC systems in buildings and determine that mandatory audits be periodically made to services buildings. This regulation also covers the quality of indoor air, including requirements determining the renewal air rates in indoor areas and the maximum concentration of the main pollutants.</p> <p>Regulation of thermal behaviour (REH) - establishes quality requirements applicable to new residential buildings and small services without HVAC systems, namely as regards the characteristics of the envelope (walls, glazing, pavements and roofs), in order to prevent thermal losses and control surplus solar gains. This regulation imposes maximum energy consumption levels for climatisation and domestic hot water production, clearly encouraging the use of efficient systems and lower-impact energy sources in terms of primary energy consumption. This regulation also determines the mandatory installation of solar collectors and evaluates the use of other renewable energy sources while rating the energy performance of the building.</p> <p>The enforcement of these regulations is controlled at different points in time, throughout the lifetime of a building, and such checks are made by experts duly qualified for the purpose. In practice these agents, together with ADENE, make sure that the SCE stays operational. The most visible face of this work is the Energy and Indoor Air Quality Certificate issued by an expert for every building or part of it, which rates them as a function of their performance on a pre-defined scale of nine classes (A+ to G).</p> <p>Each certificate is issued by the expert by way of a supporting computer system and a central register of certified buildings has been created for this purpose.</p>
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	<p>Law n.º 58/2013, of 20 August - regulates the access to the activity of the expert on energy certification of buildings</p> <p>Ordinance no. 66/2014, of 12 March - establishes the thematic contents of the exam for the expert on energy certification of buildings.</p>
LOCAL ENERGY MANAGER	<p>The legislative framework of this professional expert is the Public Sector Energy Efficiency Program (ECO.AP), as defined by the Resolution of Cabinet Council no. 2/2011, and associated are 2 other legislative documents:</p> <p>Resolution of Cabinet Council no.93/2010 – authorize the start of the works for the development of tools for climate changes politics.</p> <p>Decree-Law no. 29/2011, of 28 February – establish the legal framework of the energy efficiency management contracts.</p>
SGCIE auditor	<p>The SGCIE Auditor profile and competences are defined under the Decree-Law no. 71/2008 and is the technician responsible to monitor and to ensure the accomplishment of mandatory commitments of the facilities and installations with intensive energy consumption (over 500 toe per year).</p>

4. SPAIN

Professional profiles are divided in Spain into five levels. The Spanish National Institute for Qualifications (INCUAL) is in charge of defining the profiles from level 1 to 3 (where a pre-requisite of holding a University degree is not requested). Levels 4 and 5 are usually defined and recognized by Professional Associations and Universities through post-graduate studies. The energy manager's profile is not clearly stated in all levels but, according to the opinion of several experts from INCUAL, the Andalusian Institute of Professional Qualifications (IACP) and the Professional Association of Energy Managers in Andalusia (APADGE) different qualifications from level 3 to 5 could apply depending of the range of activities and responsibilities the technician would have. One should stress the existence of different technicians working in the field of energy efficiency, namely:

ENERGY AUDITOR	a professional that identifies and describe the situation of the installation analysed; this professional does not design or implement solutions that achieve these goals
ENERGY CONSULTANT OR ADVISER	a professional that designs and implements solutions to achieve a reduction on energy expense and carbon footprints, as well as works to raise the clients' awareness to energy consumption and costs
ENERGY MANAGER	a professional whose profile combines the identification of opportunities to reduce energy expense, the design and implementation of solutions to achieve such a reduction and a didactic approach towards clients. This professional includes the

	diagnosis, project, and development, VET of the project to improve the energetic efficiency.
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In Spain there are several organisations trying to regulate, foster or frame the figure of the energy manager. Among them we can highlight the main public institutions such as I.D.A.E. (Institute for the Diversification and Energy Savings) and all energy agencies managed at a regional level, such as EVE, INCASOL, Andalusian Energy Agency, AGENEX, ENERAGEN, as well as all local agencies.

On the other hand training institutions are dynamising both the existing and new training solutions, resorting to online training, classroom-based training, addressing professional training graduates or tertiary education graduates.

Finally, there are also professional associations, such as A3e, ANESE, APADGE or APROBASGE, that are homogeneously defining a specific framework for the formal and professional recognition of profiles.

The contents approached by these agents vary according to those who are developing the training or action plan.

It is important to highlight that there is not a clear direction in the subject and each body is trying to follow what considers to be the best or most appropriate, without much consideration of the real market needs or the common interests of different stakeholders.

The Spanish Law 235/2013 (*Real Decreto 235/2013*), published on the 5th April 2013, establishes the procedures for certifying the energy efficiency of buildings in Spain, thus implementing in the Spanish legal system the Directive 2010/31/EU. Furthermore, this legislative act also foresees the figure of the manager and/or auditor (*técnico competente*) as the person who possesses the education and training allowing him/her to:

- Prepare projects or manage building works, and to implement building works or prepare thermal installation projects;
- Issue energy efficiency certificates (article 1, paragraph 3p).

Moreover, it defines the figure of assistant manager and/or auditor (*Técnico ayudante del proceso de certificación energética de edificios*) as the professional who possesses a training course that allows him/her to assist the manager and/or auditor in certifying the energy efficiency of buildings (article 1, paragraph 3q).

Even though it has not yet been approved, there is a legislative proposal that intends to implement into the Spanish legal system the Directive 2012/27/EU, which establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 target on energy efficiency.

This Directive stresses the importance of energy audits, stating that Member-States should promote high quality energy audits to all final consumers. Such audits should be: carried out in an independent manner by

qualified and/or accredited experts, and implemented and supervised by independent authorities under national legislation.

Once this legislative proposal is approved and enforced, it is expected that accredited professionals are those that have:

- Tertiary level degree addressing topics related to energy;
- Theoretical or practical knowledge on energy audit, which can be considered in the following situations:
 - VET degree included under the Spanish National Qualification Catalogue and related to energy audit;
 - Professional competences acquired by experience and recognised by the Spanish Law 1224/2009;
 - Completion of a (theoretical and practical) professional training course on energy audit.

The Spanish Law 1177/2008 (*Real Decreto 1177/2008*), published on the 11th July 2008, establishes the Vocational Training: Superior-level Cycle (*Ciclo Formativo de Grado Superior*) on Energy Efficiency and Solar Thermal Energy.

People completing this Vocational Training Diploma are expected to acquire qualification to evaluate the efficiency of energy and water installations, technically supporting the energy evaluation and certification, and to configure solar thermal installation, managing its assembling and maintenance.

One should also point out the professional qualification framework indicated by the Spanish National Institute for Qualifications (*INCUAL - Instituto Nacional de las Cualificaciones*): energy efficiency in the buildings sector. This professional qualification includes the following unit of competences: managing the efficient use of energy, evaluating the efficiency of energy and water installations, assisting in the process of energy certification, assessing the viability of implementing solar installations, promoting the efficient use of energy and presenting improvement proposals.

Whereas the training framework is established by INCUAL, private institutions are actually the ones implementing different courses and making them available to the public.

There are several national institutions accredited by ENAC (*Entidad Nacional de Acreditación*), the Spanish entity responsible for assessing technical competence in accordance with international standards, to provide professional training courses (private non formal training).

Even though such institutions have been certified to provide training, official nation-wide certification does not exist – professionals can attend courses taught by institutions that are certified to provide such training, but there is not one single national certification issued by the State that one can request and that accredits energy managers.

Concluding, INCUAL establishes a national professional qualification framework for training related to energy efficiency. However, one can only find private companies teaching courses in this area and there is no national certificate to accredit professionals, except for professional qualifications from the National Catalogue of Professional Qualification which can be recognised by a professional certificate.

Indeed, we must stress the existence of a professional certificate (*Certificado de profesionalidad*)¹⁶, which is an official instrument of accreditation of a professional qualification from the National Catalogue of Professional Qualifications. These certificates accredit a set of professional competences that qualify a professional to exercise a professional activity identified in the National Catalogue of Professional Qualifications. Furthermore, they can also be awarded to experienced professionals, thus accrediting their professional experience.

Therefore, these certificates can be seen as similar to the European Credit system for Vocational Education and Training (ECVET) in defining a common methodological framework that facilitates the accumulation and transfer of credits for learning outcomes from one qualifications system to another.

Furthermore, the Spanish National Classification of Occupations (*Clasificación Nacional de Ocupaciones*) from 2011¹⁷ recognises the profession of technician of installations of energy production (*Técnicos en instalaciones de producción de energía*). These professionals that operate, monitor and supervise the switch panels and electric equipment in centres that control the production and distribution of electric energy or energy of other types in transmission networks. It can include professionals working in power plants, hydroelectric plants, nuclear plants, solar plants and energy systems. Nevertheless, the Spanish National Classification of Occupations does not foresee the existence of an energy manager or energy auditor.

At a regional level, Andalusia has published the Law 1/2014 (*Decreto-ley 1/2014*)¹⁸ that regulates a regional programme for promoting sustainable building/construction and that defines the figure of the energy manager as a trained professional that:

- Prepares the report of the building evaluation;
- Studies and prepares energy efficiency actions and measures;
- Participates in managing construction works;
- Signs the certificate issued by the end of construction works;
- Prepares the energy management plan of the buildings.

Once again, even though the figure and competences of energy managers are legally defined and institutions providing training are accredited to do so, there is not a national certification that assures the quality and professional recognition of such training, which results in an unregulated sector.

¹⁶ https://www.sepe.es/contenidos/personas/formacion/certificados_de_profesionalidad/certificados_profesionalidad.html

¹⁷ <http://www.ine.es/jaxi/menu.do?type=pcaxis&path=/t40/cno11&file=inebase>

¹⁸ <http://www.juntadeandalucia.es/boja/2014/58/1>

3. COMPARED VIEW ON PROFESSIONAL QUALIFICATION

The analysis of the different professional qualifications in the participating countries, permitted to identify the main common activities and sub activities between them, which are auditing, monitoring, management, certification (energy performance certificates), implementation of regulations and measures and identification of measures for energy efficiency. All these activities and sub activities came from a list of qualifications which are presented below (short version) and that will be the basis of a proposal to the matrix.

Italy	Portugal	Poland	Spain
Energy manager Expert in energy management		Energy manager	Energy manager
Energy auditor	Qualified expert on energy certification of buildings Local energy manager SGCIE auditor	Energy auditor Energy efficiency auditor	Energy auditor
Energy Certifier Heating system inspector		Energy certifier RES installer	Energy consultant or adviser

As reported in the matrix and to summarize the findings described in the previous par 2.2, with specific refer to the energy auditing professional area, in each ENACT country the situation is as follows:

- **Italy** - the figure of Energy Auditor has been introduced by the legislative Decree 102/2014 in which was identified four main energy profiles that can be of interest for the project ENACT: energy manager, expert in energy management, energy certifier and inspector of heating systems. The EA qualification frame is however quite differentiated among the regions, according to their institutional competence in the qualification schema definition, as it will be also reported in the next paragraph with the O1A2 matrix.
- **Spain** – although not clear defined, the professional profiles are divided in five levels, and for some of them it is requested a university degree, and for others are defined and recognized by professional

associations and universities through post-graduate studies; it should be stressed the existence of 3 different profiles: energy auditor, energy manager and energy consultant or adviser.

- **Poland** - National qualification system and Integrated System of Qualifications are still under development; there are two energy professions defined in Regulation of the Minister of Labour and Social Policy dated on 07.08.2014: Energy Auditor and Energy Manager.
- **Portugal** – there is not yet a defined national profile for the energy auditor and actually in the market there are 3 technicians within this category: expert on energy certification of buildings, local energy manager and SGCIE auditor (facilities and installations with intensive energy consumption).

Although the similarity of the level definition, the qualification articulation (also in terms of professional and training standards) strongly differ and, for in some country (or region) overlap with the energy manager profile on one side and the certifier area on the other side. Consequently, in order to build a common European ENACT professional profile (curriculum and ECVET based training program) all the relevant profiles have been analysed in terms of specific activities, expected outputs and learning outcomes/competences. Before deepening the compared analysis (as in the matrix O1A2, in each country, the qualification frame has been analysed taking into consideration the:

- **legislative and regulatory frame**, as well as the qualification and **accreditation bodies** and rules;
- existing **training** standards and programs for each profile and/or level as well as the **required entry level** and the competences/profile **certification process, actor and rules**;
- **national and regional qualification repertories** of EA professional profiles.

6. Energy auditor professional frame and training

At the international level the main specialization are referred to:

- **BPI Building Analyst Energy Auditor** - The Building Performance Institute, Inc. helps establish standards for improving home energy efficiency. Accredited BPI energy auditors must score at least 70 on a written exam and successfully complete a field exam. Certification is renewed every three years.
- **RESNET HERS Rater** - individual, accredited RESNET Home Energy Raters (HERS Raters) are required to score at least an 80 on an online test, successfully complete two energy ratings, and perform three ratings under supervisions
- **AEE Certified Residential Energy** - Certified AEE residential energy auditors are required to have a prerequisite minimum of engineering, architecture, or industry experience, take 12 hours of preparatory training, and pass a standardized exam. AEE residential energy auditor certification is recognized by the U.S. Green Building Council (USGBC), which administers LEED programs

- LEED Accredited Professional (LEED AP), international professional standard linked to the LEED certification. LEED certification specialist guiding building design and construction according to the LEED certification. He has not a certification role/power;
- Certified Measurement & Verification Professional (CMVP) – this certification is provided by the Efficiency Valuation Organization (EVO) and the right to use the CMVP title is granted to those who demonstrate proficiency in the M&V field by passing a 4-hour written exam and meet the required academic and practical qualifications.

At national level, there are much diversified situations, with the following common elements:

- lack of a clear definition of the concepts of 'green sector' and 'green employment'
- lack of a common skills certification system
- lack of a common professional and training standards

1. GEOGRAPHICAL COVERAGE (NATIONAL AND/OR REGIONAL)

1. ITALY

Italian regions enjoy wide discretionary powers in setting vocational and educational training strategies and programmes. Around 59% of environmental training programmes benefit from public funding (39% EU, 1% national, 17% regional and 2% local).

INITIATIVES FOR THE PROMOTION OF GREEN SKILLS

According to data from the Institute for the Development of Professional Training for Workers (Isfol), in 2009-2010 the total number of environment-related courses included 619 degree courses, 160 post-degree courses and 993 technical courses for individuals holding a secondary-school diploma. In 2010-2011 there were 534 degree courses (about 11-12 % of the total number of existing degrees), 241 post degree courses and 592 training courses. The decrease in the number of total courses is not only due to the process of restructuring of the Italian education system, but also due to the shift of part of the ESF resources from training to exceptional social safety nets for people employed in firms facing temporary difficulties, drawing on an 'anti-crisis' agreement (signed in February 2009 and annually renewed thereafter) between the Central Government and the Regions. According to this agreement, ESF funds were re-oriented so as to finance 'on derogation' benefits for workers not eligible to claim under the ordinary system, upon the condition that benefits are complemented by training initiatives. Some of the training measures have been specifically targeted at green. The 'green training courses' (i.e. those aimed not only at graduates) for 2010-2011 were distributed according to topic as follows: 165 courses in renewable energy sources, 17 in green-building, 241 in de-pollution measures, resource management and saving (50 of which were specifically devoted to waste management), 60 in environmentally friendly agriculture and 38 in economic, normative and political issues related to sustainable development (GreenItaly, 2012).

As for the returns to ‘green human capital investment’, according to a recent study (Isfol, 2011b), green degrees show a higher return than non-green ones. In addition, the employment rate of green bachelor graduates (the Italian ‘laurea triennale’) is 43.5 % one year after graduation, with medicine-related and pharmaceutical chemistry graduates registering the highest employment rates (76.9 % and 65.5 %, respectively). By contrast, green graduates in the field of engineering and architecture show lower employment rates after one year (respectively 17.5 % and 15.3 %), mainly because they are more likely to enrol in further study courses. Overall, green bachelor graduates enrol about 7 % more frequently in master’s degrees or courses, as compared to other bachelor graduates. The mean employment rate for green graduates reaches 53.4 % three years after bachelor graduation. In order to create job profiles which are suitable for the green economy, post-secondary technical courses are playing an increasing role.

An important issue has to do with the lack of a common skills certification system in Italy, which could be useful in many different ways. For instance, in the case of ‘greening’ already existing job profiles, the existence of a skills certification scheme would represent the opportunity to acknowledge the acquisition of new green skills. The usefulness of this official acknowledgment is twofold: 1) a skills certification scheme would help define ‘green workers’ and, as a result, they could be the clear object of specific labour market policies/incentives; and 2) such a scheme would facilitate the mobility of workers across regions.

Finally, the most relevant issue which has not been properly addressed in Italy is the lack of a clear definition of the concepts of ‘green sector’ and ‘green employment’. Traditional statistics do not allow the identification of a green sector and the corresponding green workers (as well as their characteristics, wage levels, etc.). Information on green employment is hence based on ad-hoc surveys, which may adopt different definitions of the green sector and green jobs. This represents a serious shortcoming since the absence of a common definition makes it difficult to carry out cross-national comparable analyses aimed at devising effective policies and evaluating their effects.

At national level, training for energy auditor hasn’t yet been recognized; however, in the following paragraphs are reported:

- A synthetic map of “green VET” system, articulated by educational levels;
- The main VET training courses related to the (initial and continuous) professional development of energy managers & auditors profiles;
- The main master level courses specifically related to the Energy Manager and the Energy Auditor.

MAP OF GREEN EDUCATION AND VOCATIONAL EDUCATIONAL TRAINING (VET)

Here following the main master level or specialization courses for energy managers and/or auditors.

	Organization		Course/Program
HIGHER EDUCATION	Lazio	HIGH SCHOOLS: Professional Institutes for Agriculture and the Environment	
	Lazio	HIGH SCHOOLS: Professional Institutes for INDUSTRY	
	CAMPANIA	HIGH SCHOOLS: Professional Institutes for Agriculture and the Environment	
	CAMPANIA	HIGH SCHOOLS: Professional Institutes for INDUSTRY	
	Emilia	HIGH SCHOOLS: Professional Institutes for Agriculture and the Environment	
Energy and environment regional "POLI" (INCLUDE "IFTS" - postsecondary vocational education)	Lazio	POLO ENERGIA AMBIENTE (ENERGY & ENVIRONMENT HUB)	http://www.poloenergiambiante.it/
	Emilia	CIRI Energia e Ambiente	http://www.energia-ambiente.unibo.it/ciri-energia-e-ambiente
	Lombardia	CLEAN - CLUSTER LOMBARDO ENERGIA AMBIENTE	http://www.energiolombardia.eu/dea
	Campania	UNIVERSITA' DI NAPOLI	http://www.unina.it
	Campania	UNIVERSITA' DI SALERNO	http://www.unisa.it
UNDERGRADUATE DEGREE I LEVEL (III YEARS)	Emilia	UNIVERSITA' DI BOLOGNA	http://www.unibo.it
	Emilia	UNIVERSITA' DI PARMA	http://www.unipr.it
	Lazio	UNIVERSITA' ROMA LA SAPIENZA (ROMA1)	http://www.uniroma1.it
	Lazio	UNIVERSITA' DI BRESCIA	http://www.unibs.it
	Lombardia	UNIVERSITA' DI VARESE	http://www.uninsubria.it
UNDERGRADUATE DEGREE II LEVEL	Lombardia	UNIVERSITA' DI MILANO	http://www.unimi.it
	Lombardia	UNIVERSITA' DI MILANO BICOCCA	http://www.unimib.it
	Lombardia	POLITECNICO DI MILANO	http://www.polimi.it
	NATIONAL	LIST OF SECOND CYCLE DEGREE: http://off.cineca.it/publico.php/ricerca/ricerca/p/cercauniv	
	Campania	Università di Napoli Federico II	University Master II level
MASTER (of the main IT Business Schools)	Lazio	LUISS Guido Carli - Roma	University Master II level
	Lazio	DIAMA - Sapienza Università di Roma	University Master II level
	Emilia	Università degli studi di Roma Tor Vergata	University Master II level
	Emilia	Università di Bologna	University Master II level
	Lombardia	Università Bocconi - Milano	University Master II level
VET	Lombardia	Università Bocconi - Milano	University Master II level
	Campania	Teleservizi IT S.p.a	specialization course
	Campania	FONDAZIONE "VILLAGGIO DEI RAGAZZI" - DON	specialization course
	Campania	Associazione Master School	specialization course
	Campania	CONSORZIO FORMA ARL	specialization course
VET	Lazio	CONSORZIO per la Formazione e la Comunicazione	specialization course
	Lazio	AISFOR srl	specialization course
	Lazio	LABOCONSULT SRL	specialization course
	Lazio	LABOCONSULT SRL	specialization course
	Lazio	CONSORZIO FORMEDIL EMILIA-ROMAGNA	specialization course
VET	Emilia	DINAMICA soc.cons.r.l	specialization course
	Emilia	TECHNE Società Consortile a responsabilità limitata	specialization course
	Emilia	CTQ Spa	specialization course
	Lombardia	ESEM - Ente Scuola Edile Milanese	specialization course
	Lombardia	ESEM - Ente Scuola Edile Milanese	specialization course

Course Title	Certificate/Level	Organization	Link	Contents & Notes
Green Energy Audit (http://www.green-energy-audit.it/)	NA	Nextville	http://www.nextville.it/index/1325	Green Energy Audit Book Overall initiative and book together with: - Kyoto Club - GBC (Green Building Council) Italia
4 levels training course on Green Audit	NA	GBC	http://www.gbci.org/formazione?loca=it	1) Information level 2) Knowledge level 3) Application level 4) Specialization level

					Establishment Assessment Environmental Method) certifications (the first US, the second UK)
GFS Green Facility Specialist	Green Facility Specialist (as professional recognition)	IFMA (partnership with GBC)	http://www.gbciitalia.org/page/show/corsi-di-formazione-in-collaborazione-con-altri-enti-2?locale=it	3 modules: 1) environmental sustainability, "green building", energy efficiency 2) facility management; 3) Application of 27/2012 rules and international procedures of energy auditing; international rating system; best practices on energy efficiency management	Linked to LEED
Expert of ITACA protocol/system	Professional recognition	IISBE	http://www.iisbeitalia.org/ there is a public list of experts: http://www.iisbeitalia.org/formazione/esperti-protocollo-itaca/avanzato		Linked to ITACA protocol The International organization IISBE (http://iisbe.org/imosb) organize the iisBE International Masters Programme (Erasmus Mundus) of 120 ECTS credits
Energy Audit	VET short specialisation courses/webinars and workshops	Energy Audit	http://www.the-energyaudit.it/	Energy School for Energy Manager (http://www.the-energyschool.it/)	
Energy Auditor		Enforce Adiconsum	http://www.enforce-eeen.eu/ita/eventi/formazione-energy-auditors	2012	See ENFORCE comparative study: http://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/enforce_european_comparison_energy_auditors_training_en.pdf
Energy manager	VET short specialisation courses/webinars and workshops	FIRE in partnership with ENEA	http://www.fire-italia.it/caricagine.asp?target=corsi.asp	Training for Energy Manager and e-Quem	

Below the main relevant Master level courses more specifically related to the professional figure of the “Energy Auditor”.

MASTER	ORGANISATION
Master Ridef Energia per Kyoto (Ridef – Energy for Kyoto)	Politecnico di Milano ¹⁹
Master in gestione delle risorse energetiche (Management of energetic resources)	SAFE ²⁰
Master in Green Management, Energy and Corporate Social Responsibility – MAGER	Università Bocconi ²¹
Executive Master in Ambiente e Energia (Executive Master in Environment and Energy)	Strategies Business School ²²
Master in Management e regolazione dell’energia sostenibile (Management and control of sustainable Energy)	LUISS Guido Carli ²³
Master per Esperti in Gestione dell’Energia (Energy Management Experts)	CTQ – Consulenza e training di qualità ²⁴
Master in Energy Management	Università della Calabria ²⁵
Master in Governance dello sviluppo sostenibile (Governance of sustainable development)	Università di Padova ²⁶
Master Manager dei sistemi di gestione dell’energia, certificazione energetica, risparmio energetico, energie rinnovabili (Manager of Energy management systems, Energy certification, Energy saving, renewables energies)	CSAD – Centro studi ambientali e direzionali ²⁷

¹⁹ <http://www.ridef.it/>

²⁰ <http://master.safeonline.it>

²¹ <http://www.unibocconi.it/>

²² www.strategies-online.it

²³ <http://energiasostenibile.postlauream.luiss.it/>

²⁴ <http://www.ctq.it/i-master-aziendali/energy-master/>

²⁵ <http://www.unical.it/portale/portaltemplates/view/view.cfm?19233>

²⁶ <http://www.spgi.unipd.it/didattica/corsi-di-studio/master>

²⁷ www.csad.it

1. POLAND

The following section will describe the training for energy auditors, energy certifiers and RES installers. Due to deal with industrial energy audits the qualification and training of energy efficiency auditor is not mention above.

Profile	Accreditation		Accreditation body
Energy certifier	Yes	Obligatory	Ministry of Infrastructure and Development
Energy auditor	No	-	-
RES Installer	Yes	Volunteer	Office of Technical Inspection (UDT)

Profile	Type of education	Structure and methodology of training
Energy auditor and certifier	<p>Higher schools provide education together in energy auditor and certification competencies on post graduates studies. At least 25 public technical universities provides studies to gain qualification for preparing audits and certificates, also many private higher school provides education in this direction in all country.</p> <p>Private trainings are also provided by the several institution operating in the field of energy efficiency like KAPE and Energy Conservation Foundation which realizes separately trainings for energy auditor and separately for Certifiers.</p> <p>Requirements from candidates:</p> <ul style="list-style-type: none"> for studies: master diploma 	<p>Program of trainings or postgraduates studies are elaborated on the basis of executive act describing in detail the way of preparing energy audit or energy certificate.</p> <p>Pedagogic contest for energy audits training is based on the Act on Support for Thermal Refurbishment and Renovations from 17.10.2008 (Dz.U. 223, poz.1459) and Regulation of the Minister of Infrastructure from 17.03.2009 (Dz. U. 43, pos. 346) on the form and content of energy audits and renovation.</p> <p>For energy certifier pedagogic contest is based on appropriate Regulation on the methodology for calculating the energy performance of the building</p> <p>Postgraduates studies</p> <p>The minister responsible for education approves program studies, taking into account opinion of the minister responsible</p>

	<ul style="list-style-type: none"> for trainings: master diploma and experience 	<p>for construction, local planning and spatial management and housing.</p> <p>Example of studies on "Certification and Energy Audit of Buildings"</p> <p>organized by the Faculty of Environmental Engineering</p> <p>Wroclaw University of Technology</p> <p>Duration of study: 2 semesters - 249 hours + 15 hours work final</p> <p>Number of ECTS credits: 96</p> <p>Private training:</p> <p>Energy Conservation Foundation provides trainings for energy auditors.</p> <p>The training consist of two stages:</p> <p>Preliminary stage - self-study – listeners read the lecture and training materials –at least 10 days before</p> <p>3- day training (24 hours) in Warsaw. Training consist of lectures, exercises and self-calculations and preparing of fragments Energy Audit - under the guidance of trainee</p> <p>Training is conducted in the form of lectures and exercises with elements of individual work.</p>
RES Installer	<p>Education of executive-level employees involved in renewable energy according to the current education law can be carried out in the school system- within the framework of Vocational Training. From 2011 it is possible to educate in the profession of technician of equipment and renewable energy systems</p>	<p>A detailed scope of profession and its objectives, means professional skills which student must achieve contain the regulation on core curricula (Dz.U. 100/2011, pos. 582). It consist also the recommendations for appropriate laboratory and workshop equipment.</p>

	<p>Completion of a four-year technical school allows achieving vocational qualifications and diploma after passing the vocational qualifications exam, as well as obtaining a matriculation certificate after passing the matriculation examination.</p> <p>Profession is currently taught in 17 schools in Poland for 272 students. Certified RES Installer is volunteer</p> <p>From 1 September 2012. achieving qualifications of RES technician is also available through attending to vocational qualification course involving two qualifications:</p> <ul style="list-style-type: none"> • installation of equipment and renewable energy systems, • operation of equipment and renewable energy systems. <p>The course ends with an examination before the Regional Examination Board.</p>	<p>The training program in this profession accordance was established with the Regulation "Core curriculum for vocational education - technician and equipment renewable energy systems" issued by the Ministry of Education in 2010.</p>
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2. PORTUGAL

EXPERT ON ENERGY CERTIFICATION OF BUILDINGS	<p>Structure and methodology</p> <p>Under the law and ordinance before mentioned, the training of expert on energy certification of buildings is not compulsory. In fact, to be qualified as expert on energy certification of buildings, the candidate should fulfil the following requisites:</p> <ul style="list-style-type: none"> • degree on engineering or architecture • 5 years of professional experience on activities related to buildings construction and/or project • approval on an exam provided by ADENE. <p>After the fulfilment of the above requisites, the candidate should present to ADENE a formal request for the recognition as expert on energy certification of buildings. ADENE</p>
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	<p>proceed with the verification of the request and validation, and then issue the professional title. There are two categories of experts:</p> <ul style="list-style-type: none"> • Expert for residential sector and small service buildings (PQ-I) • Expert for commerce and service sectors (PQ-II) <p>The type of training</p> <p>As above mentioned, the training is not compulsory to obtain the qualification as expert on energy certification of buildings, but as one of the requisites is to get approval on an exam, ADENE, since the beginning of 2014, promoted training courses aiming to prepare and transmit the necessary knowledge for that evaluation. In this context, with a national coverage (Lisboa and Porto) and for each category, the training offers include the following courses:</p> <ul style="list-style-type: none"> • Certification of REH, with a duration of 7 days (56 hours) • Course of RECS, with a duration of 4 days (32 hours) <p>The training is at a classroom, the pedagogic contents are accordingly the legislation above mentioned and the Course on Certification of REH includes an evaluation for those trainees that wish to be certified (in a voluntary basis) as a REH designer by a certifier entity.</p> <p>As the training for these experts is voluntary, there is no need to request or to develop a process of recognition.</p>
LOCAL ENERGY MANAGER	<p>Structure and methodology</p> <p>The training of Local Energy Manager is regulated by the Resolution of Cabinet Council no. 2/2011 which established ADENE as the entity responsible for this activity. The Local Energy Manager is the technician responsible for the energy management of the facilities and buildings of each entity or service of the public administration.</p> <p>The type of training</p> <p>ADENE, as the management entity appointed by the Portuguese government, from September 2014 to October 2014, developed more than 30 training courses, with a national coverage (North, Centre and South) and with duration of 5 days (40 hours).</p> <p>The training was mixed, i.e., at a classroom and e-learning, the pedagogic contents are accordingly the legislation above mentioned</p>
SGCIE AUDITOR	<p>ADENE is the entity responsible for the recognition of SGCIE Auditor which can be a single person or a company. For that purpose, the candidates should present evidences</p>

	regarding academic qualifications and professionals, as well as adequate experience for the tasks to be developed.
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3. SPAIN

Currently there is no clear regulation in the area of training for energy managers, neither a single educational framework. The figure of the energy manager (or auditor) itself has many aspects.

Initially, training was developed by companies that monitor international norms. Afterwards, sectorial associations have developed their own standards, and universities and professional training centres have also developed them.

On the other hand, one must take into consideration the wide range of existing online training courses.

Some companies, centres or institutions that provide training courses related to energy efficiency and energy management include: CIRCE, AE3, ANESE, EEV, Inega, Ihobe, Exitae, UNED, Bureau Veritas, AENOR, CAFARAGON, University of Seville, and University of Alcala, among many others.

There are currently several Master degrees and post-graduate degrees that encompass renewable energies and energy efficiency. There are also courses that address topics like installations and energy efficiency, and maintenance and energy efficiency.

On the other hand there are also VET centres that have developed and provide Superior-level Cycle degrees. Graduates are awarded the title of Higher Technician (*Técnico Superior*).

This scenario is developed in quite an uncoordinated way and without defining a clear professional profile. The uniqueness of the Spanish State in this type of competences results in a “competition” between the Autonomous Communities, public and private institutions in terms of providing training to future professionals, without much consideration to the end result, which would be the reduction of energy demand by consumers.

Therefore, when analysing the existing offer for energy manager (or auditor) training, it is possible to observe Level 3 qualifications (as defined by INCUAL and that refer to Vocational Training degrees), which is considered to be adequate and appropriate for the professional requirement of an energy manager (or auditor), as detailed below. But there are also qualifications of a higher level (Levels 4 and 5), which are managed by Professional Associations and Universities.

Even though this sector is unregulated, we would like to present several training opportunities divided by training level: Higher Education, Vocational Training and non-formal training.

Higher Education:

As said before, there is no any official training for this kind of professionals; however, there are some Degrees close to the profile of the energy managers/auditors:

- Degree in Energy Engineering by the University of Seville and University of Málaga (Grado en Ingeniería de la Energía por la Un. de Sevilla y la Un. de Málaga) – graduates will have acquired competences to develop a profession in the following sectors: energy resources; thermal energy generation technologies; renewable energy sources; energy distribution; energy transformation; energy efficiency; energy markets; environmental, economical, legal and safety aspects related to energy.
 - Career opportunities
 - Petrochemistry;
 - Energy suppliers;
 - Transport, industry, building/construction;
 - Renewable energies;
 - Engineering and consulting;
 - Public Administration;
 - Private and public R&D centres.

Other Engineering Degrees are close to the professional profile of the energy auditor, and a significant percentage of the students holding these degrees choose energy efficiency as specialisation. One example is the Degree in Civil Engineering with specialisation in Renewable Energy.

- Official Post degrees:
 - Master in Integrated Management of Building;
 - Master in Environmental Engineering;
 - Master in Electric energy systems;
 - Master in Thermal energy systems;
 - Master in Energy and transport intelligent systems.
- Other Post degrees:
 - Specialisation in Energy management in the building sector (UNED, Spanish National Distance Education University);
 - Master in Renewable Energies and Electric Systems (UNED, Spanish National Distance Education University);
 - Online Executive Master in Renewable Energies (Escuela de Organización Industrial, School for Industrial Organisation).

People completing these University degrees do not automatically acquire skills or knowledge to work as energy managers and additional non formal training might be necessary. However, since the profession of energy manager is unregulated and does not exist a national official certification to accredit these professionals, one can find graduates from several areas of studies working as energy managers.

Vocational Training:

Within the framework of Vocational Training, we can find the abovementioned “Superior-level Cycle on Energy Efficiency and Solar Thermal Energy” (*Técnico Superior en Eficiencia Energética y Energía Solar Térmica*), an official training course with a duration of 2000 hours (Spanish Law, *Real Decreto*, 1177/2008).

- Requirements:²⁸
 - Direct access:
 - Being in possession of Baccalaureate diploma;
 - Having passed the second course of any modality of experimental Baccalaureate;
 - Being in possession of any Superior-level Cycle or equivalent;
 - Having passed the University Orientation Course (COU);
 - Being in possession of any University Degree or equivalent.

For those who cannot reach any of the requirements listed above, there is an alternative admission test, which can be undertaken by people, who:

- Are 19 years old the year of the test; or
 - 18 for those who already have a middle-cycle of Vocational Training education.
- Training Plan:
 - Training modules:
 - Thermal equipment and installations;
 - Installation processes;
 - Graphical representation of installations;
 - Energetic efficiency of installations;
 - Facilities’ energy efficiency;
 - Buildings’ energetic certification;
 - Efficient water management in edification;
 - Thermal solar facilities configuration;
 - Assembly and maintenance management of thermal solar facilities;
 - Efficient use of water and energy promotion;
 - Energy efficiency and solar thermal energy projects;
 - Career guidance;
 - Entrepreneurship;
 - Internship in workplaces.

²⁸ <http://www.todofp.es/todofp/que-como-y-donde-estudiar/que-estudiar/familias/energia-agua/eficiencia-energetica-energia-solar.html>

This curriculum is further developed at a regional level, where each Autonomous Community establishes the norms applicable to institutions providing training that awards the title Superior-level Cycle on Energy Efficiency and Solar Thermal Energy (Técnico Superior en Eficiencia Energética y Energía Solar Térmica).

In Andalusia this further development is established in the Order published on the 7th July 2009²⁹. This Order mentions that the main goals to be achieved by students completing the course are as follows:

- Being able to characterise thermal and light installations and analyse the basis parameters of its functioning, in order to evaluate energy efficiency;
- Analyse equipment, components and energy saving systems;
- Identify and characterise equipment and components of lighting systems;
- Analyse the different types of enclosures;
- Analyse the different types of installations for hot water, plumbing, heating, cooling and lighting, assessing the potential for energy saving;
- Analyse the thermal behaviour of buildings and installations;
- Analyse the administrative procedures to obtain an energy efficiency certificate according to the Spanish Law;
- Characterise water installations in buildings, analysing its basic functioning;
- Analyse reports for the improvement of water installations, justifying the proposals for reducing water consumption;
- Analyse regulatory requirements on energy supply and implementation of solar installations;
- Identify and characterise equipment and components of solar thermal installations;
- Analyse projects of solar thermal installations, identifying relevant information for reports;
- Define procedures for the assembly and start of solar thermal installations;
- Define procedure for the maintenance of solar thermal installations;
- Analyse sales guides, justifying the advantages and benefits of products and services to save energy and water;
- Analyse the regulations, energy plans and European, national and regional policies, selecting the most relevant information on energy and water efficiency to explain to consumers;
- Identify techniques and evaluation procedures related to informing consumers and promote energy and water efficiency;
- Analyse measures for the prevention of occupational risks, measure for safety and for environmental protection, identifying the legislation applicable on solar thermal installations;
- Describe the roles within a work group and identify responsibilities, in order to establish appropriate professional relations;

²⁹ <http://www.todofp.es/dctm/todofp/fichas-titulos/curriculos-ccaa/ena/eficienciaenergetica/andtsfciencia-energetica-energia-solar-termica.pdf?documentId=0901e72b81c20f6d>

- Identify how to intervene in order to solve professional and personal conflicts, in order to ensure an appropriate working environment;
- Identify and assess opportunities of professional improvement and training;
- Identify changes (technological, organisational, economic and labour) in the profession, assessing the implication of such changes, in order to maintain an innovative approach;
- Recognise business opportunities, identifying market needs;
- Recognise the rights and obligations of an active agent in today's society.

All courses must include and address the following professional modules:

- Installation processes;
 - Graphical representation of installations;
 - Energetic efficiency of installations;
 - Buildings' energetic certification;
 - Efficient water management in edification;
 - Thermal solar facilities configuration;
 - Efficient energy and water promotion;
 - Thermal equipment and installations;
 - Energy efficiency and solar thermal energy projects;
 - Entrepreneurship;
 - Workplace training.
-
- Career Opportunities

Both in private and public sectors, private companies working in this area or through self-employment, assuming the following occupations:

- Solar installation sales;
 - Assembling and maintaining solar thermal installations;
 - Energy manager;
 - Assistant in energy certification processes;
 - Promotion of energy efficiency programs.
-
- Access to University
 - After completing the Superior-level Cycle on Energy Efficiency and Solar Thermal Energy, students have access to Higher Education studies;
 - Preferential access to Higher Education courses is given to those who have studied Science, Engineering and Architecture.

- Training Centres in Andalusia:
 - IES Reyes de España, Linares (Jaén);
 - C.C. Virgen de los Reyes (Sevilla);
 - IES Marqués de Comares, Lucena (Córdoba);
 - IES Virgen del Carmen, Puerto Real (Cádiz);
 - IES Politécnico, Sevilla;
 - Cesur (Sevilla and Málaga. Face to face and also distance learning).

Private non formal training:

It is also to be highlighted the existence of private training courses (non-formal training) that focus on acquiring skills related to energy efficiency. Private institutions are actually the ones implementing these courses and making them available to the public.

Some examples follow:

Energy auditor in in the building sector (*Auditor Energético en Edificación*)

A course provided by A3E, the Association of Energy Efficiency Companies and certified by ENAC (the Spanish entity responsible for assessing technical competence in accordance with international standards). This training course is intended to prepare its students to perform and supervise energy audits in buildings and must fulfil requisites such as a minimum of 200 hours. More specifically, this course will:

- prepare the energy auditor to conduct audits and energy certifications of buildings
- revise the legislation applicable to energy installations in buildings
- provide knowledge on the available energy solutions
- introduce students to computer programs for energy certification
- provide knowledge on how to operate and handle measurement and monitoring devices
- apply the procedures for measuring and assessing savings
- provide an introduction to companies providing services in the area of energy

Training contents include the following modules:

- Basic concepts on energy and heat transmission
- Energy structure of the building
- Energy in the building sector and equipment
- Technological development in the sector of renewable energy
- Process of measurement and verification of measurement
- Regulations on energy efficiency and air quality
- Framework programmes for the energy rating of buildings

- Energy audit as an element for the analysis and diagnostic
- Energy savings and energy efficiency measures
- Companies providing services in the area of energy and its financing

This course is expected to prepare attendees to obtain the certificate by AEC (the Spanish Association for Quality). Certification regarding energy auditors in the building sector is awarded to university graduates in the areas of Engineering, Architecture, Environmental Science, Physics and Chemistry that attended a training course on energy efficiency and successfully completed a knowledge test.

Chief energy auditor in the building sector (Auditor Energético Jefe en Edificación)

AEC (the Spanish Association for Quality) also awards certification for chief energy auditor in the building sector. Certification is awarded to university graduates in the areas of Engineering, Architecture, Environmental Science, Physics and Chemistry that have a minimum work experience of 3 years and have conducted at least 20 energy audits.

Energy Manager (Gestor Energético)

APADGE (Andalusian Professional Association of Energy Managers) provides a 90-hour course on energy management that intends to provide participants with a general overview of processes, measures and implementation of projects of energy efficiency. The figure of the energy manager is defined as the professional that intervenes in several areas related to energy, such as:

- Energy supply – contracting supervision, managing offers, periodic follow-up, solving issues, predict consumptions and provide an adequate budget
- Quality supply – solving issues, preventive actions, ensuring the quality of supply
- Monitoring legislation – follow-up and adaptation to new norms, proposing adaptation and improvement measures
- Action Plan – design and development of a plan, defining a timing for actions, evaluating results and managing aids

The course structure is as follows:

- Introduction and general concepts
- Energy management procedures and processes
- Energy management as a tool for business

Coverage and institutions responsible

INCUAL is the institution establishing a national professional qualification framework for training related to energy efficiency.

However, even though there is a national framework that intends to even training courses nationally, one can only find private companies teaching courses in this area and there is no national certificate to accredit professionals.

Since the energy efficiency training is an unregulated sector that is currently expanding due to the increasing demand of professionals, training is available unevenly throughout the country, depending on demand and the interest of such institutions in providing this training.

As fully detailed on “2.2.Legislative framework and national qualification framework”, training related to energy efficiency in Spain must be considered volunteer, as it depends on the trainees and no specific professional training is required.

At a University and Vocational Training level, training is mostly at classrooms and evaluation differs from institution to institutions. However, one can state that it is predominantly based on exams. Certification is provided through the degree diploma.

At a non-formal training level, training methods vary and can be onsite (classroom), online (e-learning) and blended (b-learning). Certification can be provided through a document issued by each institution that makes proof that the trainee has attended the course. Still, as mentioned, this is valid only as a proof made by the institution and does not entail any sort of national official certification, as such a certification does not exist.

[ENAC](#), *Entidad Nacional de Acreditación*, is the Spanish entity responsible for assessing technical competence in accordance with international standards. It is a non-profit body that accredits institutions providing conformity assessment services, regardless of the sector in which they operate, such as:

- Laboratories;
- Inspection Bodies;
- Certifying Bodies;
- Environment Verifiers;
- Greenhouse Gas Emission Trading Verifiers;
- Intercomparison Program Providers;
- Control Bodies.

It is important to stress that ENAC only accredits institutions and not the institutions’ employees or trainees. On ENAC’s website, it is possible to view institutions that have been accredited per area of activity. Under “energy management systems”, one can find AENOR (Asociación Española de Normalización y Certificación), the Spanish Association for Standardisation and Certification.

AENOR is a private non-profit organisation that accredits and certifies companies and products according to international norms, such as ISO norms, in several areas of activity. Even though the certification provided by company is quite valued and recognised, one should argue that it is a private institution.

Thus, as thoroughly explained, in Spain there is a lack of national official certification provided by the State.

Registers

Energy certifier	<p>Central register of the energy performance of buildings, which includes lists of persons entitled to draw energy performance certificates lead minister responsible for construction (D.U.2014 poz. 1200. Article 31).</p> <p>Number of energy auditor in central register (2.12.2014) – 10565</p>
RES Installer	<p>Central register in Office of Technical Inspection is an accreditation body for training providers in the field of renewable energy sources. In the register is only 12 training providers.</p> <p>Central register for RES Installer lead Office of Technical Inspection it contains 77 certified installers (mostly PV). It works from November 2013.</p>
Energy auditor	<p>Currently in Poland operating at least 2 non-formal lists of energy auditors. Chronologically older is a list of energy auditors authorized the Polish National Energy Conservation Agency established in 1996. The process of training and authorization auditors was based on the Danish experience and there were trained first auditors. In the list of authorized energy auditors KAPE has now 201 people. Last authorization of new auditors was in the 2010 year. 1810 were trained upto 2010.</p> <p>Requirements for inclusion: relevant experience, length of service and performing three energy audits. The quality of audits is verified. Authorization process ends within positive passing of the exam.</p> <p>The list is available on the www.kape.gov.pl at: http://www.kape.gov.pl/dbaudit/fs-audita.phtml .</p> <p>Besides list of KAPE SA there is also a list of energy auditors carry on by Association of Energy Auditors, established in 2000. The list begun to function in 2005.</p> <p>Requirements for inclusion: at least three positive verified by BGK (National Economy Bank) energy audits in accordance with the Act on refurbishment and renovations</p> <p>List and rules of inclusion on the list are available on the website: www.zae.org.pl</p> <p>On the list there is around 330 energy auditors (03.2015). The association has more than 1400 members.</p>

7. BEST PRACTICES: existing educational and VET curricula - training program (public and private) - European / national initiatives

1. ITALY

1. COMPENER

COMPENER is a “Transfer of Innovation” European project funded by Leonardo Da Vinci Programme, led by ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) and coordinated by ISFOL (The Italian National Agency for EU’s Lifelong Learning Programme). It involves 6 partners from 3 Member States: Italy, Spain and Romania.

COMPENER project aims at developing qualification and certification schemes for professional skills in the energy sector, in line with the provisions of the Directive 2009/28/EC on the promotion of the use of energy from renewable sources and with the Directive 2010/31/EC. In particular, the article 14 of the Directive 2009/28/EC requires each Member State to ensure by 31 December 2012 the availability of certification or equivalent qualification schemes for installers of building-integrated biomass stoves and boilers, small-scale solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps.

COMPENER stimulates innovation transferring both ENEA e-learning contents (developed in the framework of previous European funded Projects) and the Italian expertise in the professional qualification and Renewable Energy Sources (RES) certification schemes to Spain and Romania.

Link: <http://www.compener.enea.it/Layout/compener/index.asp>

2. E-QUEM PROJECT (E-QUALIFICATION ENERGY MANAGER)

The project E-QUEM (E-Qualification Energy Manager), managed by ENEA and launched in 2007 in the Equal Program intends to apply a strategy based on the following two main actions:

- qualification of professional offers through an Energy Manager (EM) skills certification system and a continuous on-line training process;
- providing support to enterprises, professional associations and public bodies to define features, roles and tasks of Energy manager.

In operational terms, the strategy proposed by this project provides for a top-down as well as a bottom-up approach.

The top-down action is centred on skills certification, regarding essentially awakening, information and EM generic training actions. The bottom-up action foresees the direct involvement of sector leader entities, through an endorsement procedure, in definition, valorisation and promotion of role and mission of energy

manager. Mainstreaming activities will be integrated in this bottom-up process in order to make public administrations and entities aware of this professional figure and make them recognise this figure as an effective interface for policy implementation.

The action programme finalized to the accomplishment of these objectives includes:

1. the implementation of an interactive modular on-line self-training course.
2. the establishment of a Certification Procedure of EM ability and skills and the creation of a Register of Qualified Energy Managers.
3. an on-line EM professional skill training and retraining system (Community learning Platform).
4. an endorsement and mainstreaming campaign creating the endorsers pool for advice and control.

Link: www.e-quem.enea.it/

3. PROFESSIONAL PROFILE OF ENERGY AUDITOR

Within the NQF, the profile of the Energy Auditor is referentiated to the energy saving professional area and to which diverse professional profiles are referred such as the renewable energy expert or the solar plant designer (<http://professionioccupazione.isfol.it/scheda.php?limite=1&id=3.1.3.6.0>).

Finally, a recent work of the Ministry of Labour and Welfare (through its National Agency - Italia Lavoro) has better defined the professional profile of the Energy Auditor, detailing its competences, training materials have been also realized.

Both learning resources and professional profile analysis can be found at the link:

http://www.cliclavoro.gov.it/Progetti/Green_Jobs/Documents/Edilizia_sostenibile/Energy_Auditor.pdf

2. POLAND

Education of energy auditor and energy certifier is provided by nearly all public technical universities and several non-public higher education institution. The program of studies is nearly the same at every academy it allows to provide:

a) the energy performance of buildings on the basis of:

- Regulation of the European Parliament and of the Council 2010/31/EU on the energy performance of buildings (EPBD Recast) date on 19.05.2010 r.
- Regulation of the Minister of Infrastructure and Development “Methodology for calculating energy performance building” date on 03.06.2014 r.
- Act on Energy Performance of Buildings date on 29.08.2014 r.

b) energy audits of buildings to the needs of thermomodernization basis:

- Act on supporting refurbishment date on 21.11.2008. with amended

c) evaluating the energy efficiency of buildings on the basis of:

- Regulation of the European Parliament and of the Council 2012/27 / EU on energy efficiency (EED) date on 25.10.2012r.

d) the exchange of technical projects in the ecologically combustion heating clean - in force since 2011.

e) the design of low energy buildings - in force since 2012.

Example of studies programme on "Certification and Energy Audit of Buildings"

organized by the Faculty of Environmental Engineering Wrocław University of Technology

Duration of study: 2 semesters - 249 hours + 15 hours work final

Number of ECTS credits: 96

Substantial scope of programme studies:

- Legislation and regulations in the EU and Poland
- physics of building
- Design of buildings taking into account the energy class
- The energy efficiency of building heating systems
- The energy efficiency of air conditioning systems in buildings
- Energy efficiency of hot water systems
- Energy efficiency of energy installations
- Methods of assessing energy performance of buildings
- Thermomodernization and energy audit
- Economic analysis of the cost-effectiveness of solutions
- Energy management in buildings
- Diploma Seminar

The Polish National Energy Conservation Agency (KAPE) - ENACT Polish partner is a national leader in the area of efficient energy management. One of the core business KAPE is a sustainable building, including support and promotion of thermo-refurbishment (thermo-modernization) in buildings. KAPE already in 1996 took part in the project "Energy consultancy scheme for buildings" developed under the Polish-Danish governmental programme granted by the Danish Energy Agency. Within the framework of the project trained 12 building energy auditing trainer were educated by DTI in Denmark who developed a training curriculum and set up basis for building energy consultancy scheme in Poland. Since then, more as 4500 professionals have been trained under this voluntary scheme.

Substantial scope of training program:

- The use of energy and energy savings.
- Legal Regulations / National Policies

- Energy consulting
- Thermal protection of buildings.
- Boilers for solid fuel, liquid and gas.
- Ventilation and air conditioning.
- Heat pumps and renewable energy sources.
- Internal heating systems and heating systems.
- Economical use of water.
- Saving electricity.
- Energy management and energy measurement.
- Economic and energy efficiency evaluation of investment
- Methods of measurements and tests.
- The technique of thermography.
- Energy Auditing in residential sector and public buildings.
- Financing projects and cooperation with banks.

The network of entities offering the training for energy auditors was very wide but within introduction courses related to auditing to higher education the number of training courses offered by other private entities and companies has decreased.

The most known training entity is **Energy Conservation Foundation** which was established in 1992. It is a non-profit organization and a Business Environment Institution which focuses its efforts on issues related to energy efficiency. The main goals of the Foundation are promotion of energy efficiency issues, social education and preparation of specialists in the field of energy advisory and energy efficiency. High quality of training and advisory services of the Foundation ensures the implemented Quality Management System which complies with PN-EN ISO: 9001:2009.

Energy Conservation Foundation, as the first one in Poland, published the standard for Energy Auditing and commenced trainings for the energy audit activities.

Energy Conservation Foundation trainings for energy auditors.

The training consist of two stages:

- Preliminary stage - self-study – listeners read the lecture and training materials –at least 10 days before
- 3- day training (24 hours) in Warsaw. Training consist of lectures, exercises and self calculations and preparing of fragments Energy Audit - under the guidance of trainee

Training is conducted in the form of lectures and exercises with elements of individual work.

Substantial scope of training program

The course covers the following subjects:

- a. on the basis of the training materials submitted (initial stage) for self-study
 - a. Energy use and energy savings in buildings
 - b. Energy consulting
 - c. Heating systems
 - d. Domestic hot water
 - e. Ventilation systems
 - f. Solid fuel boilers, liquid and gaseous
 - g. Heat pumps and renewable energy sources
 - h. Energy saving electrical installations
- b. lectures and exercises in a group (3-day training)
 - a. Legislative for audits
 - b. Thermal protection of buildings
 - c. Calculation of energy consumption in buildings
 - d. Economic analysis and efficiency of thermomodernization
 - e. Methods of preparation of thermomodernisation audits
 - f. Methods of preparation of audits of repair

Project NEW EXPERT

In order to help businesses that want to apply the latest energy efficiency solutions in buildings, Energy Conservation Foundation prepared the very interesting project NEW EXPERT – a tool that makes it possible to select and make innovations within the enterprises through the transfer of know-how at no cost.

The national project entitled “New pro-innovation services in energy consultancy for buildings” was implemented as part of the Operational Program Innovative Economy Measure 5.2.

Structure and methodology

The target group were entrepreneurs providing businesses service in one of three areas of energy efficiency in buildings:

- energy advice, including the preparation of energy audits and energy certification of buildings;
- design of buildings and utility installations in buildings;
- property management throughout its service life.

Know-how transferred to a business entity comprises eight subject areas, described below. Knowledge and tools relating to individual issues had been grouped as a know-how set prepared for transfer within the business entities.

- Energy supply systems in new buildings

- Evaluation of the level of heat retention in buildings
- Evaluation of the quality of the interior climate and whether a building is airtight
- Use of renewable energy in buildings
- Designing of low-energy and passive buildings
- Energy management systems in buildings
- Methods for evaluating the environmental impact of use of the building
- Methods for effective implementation of technological and organizational know-how in a business

The know-how package was transferred in stages. Each subject area was transferred separately during 2-4 day group or individual meetings with project consultants and experts. Depending on the type of issue, the meetings take the form of:

- a lecture with exercises,
- workshops, including use of diagnostic equipment,
- consultations regarding independently prepared projects – studies of participants' own cases at random or cases prepared by the consultant,
- study trips to look at practical implementation of projects.

The business entity receives a set of materials with every transferred part of the package: textbooks, procedures, sample reports, ring binders and spreadsheets.

280 benefices took part in the project, up to 173 enterprises transferred issues of know-how dedicated to energy advisors.

3. PORTUGAL

1. IMPLEMENTATION OF EPBD DIRECTIVE IN PORTUGAL - TRAINING AND QUALIFICATION OF ENERGY AUDITORS FOR THE ENERGY CERTIFICATION OF BUILDINGS

The Decree Law 78/2006 of 4th April defined the operational rules for the system for energy and indoor air quality certification of buildings, and establishes that only qualified experts (or energy auditors) are allowed to issue certificates and carry out inspections to heating, ventilation and air conditioning systems (HVAC). In order to get such professional licence, experts should meet the minimum professional requirements that were set up on a Protocol dated 21 July 2006 between the Directorate-General of Energy and Geology (DGEG), the Portuguese Environmental Agency (APA), the Counsel of the Public Works and Transports (CSOP), and professional associations of Architects and Engineers.

The Protocol states that the recognition of a qualified expert, which is under the responsibility of the professional association, requires:

- Full membership of professionals associations of Architects and Engineers.

- Minimum of five years of professional experience, on the basis of peer-analysis of his/her CV, carried out by elected boards of the professional associations.
- Attendance of recognized courses and passing a demanding national examination procedure that evaluates their knowledge about the technical issues of the building regulations and the details of the certification system itself.

The training activities were available in the three areas covered by the system and award different qualifications for accredited energy Qualified Experts:

- RCCTE - Regulation on thermal behaviour of buildings (residential and small non-residential)
- RSECE - Regulation on heating, ventilation, air conditioning (HVAC) systems in buildings - energy component (for large non-residential buildings)
- RSECE - Regulation on heating, ventilation, air conditioning (HVAC) systems in buildings – indoor air quality component (for large non-residential buildings)

Training of trainers and of energy auditors

In Portugal, official training actions began in October 2006. The first courses were organized by ADENE- Portuguese Energy Agency, the SCE managing entity, and targeted to train the trainers of future qualified experts.

After attendance, including examination, the trainees could be qualified as accredited qualified expert (if the other minimum professional requirements were fulfilled) and accredited trainer of qualified experts. About two hundred (200) engineers and architectures have concluded and got one or both qualifications.

Training of energy auditors

Once concluded the 1st phase of training for trainers, started the specific training courses for energy auditors, which were structured in two modules:

- three technical modules (minimum 30h, plus 3h examination), lectured by recognized organisations.
- two Certification modules (30 hours for RCCTE course and 48 hours for RSECE –E and RESECE QAI course, plus 3 days (from 12 to 16 hours for examination), lectured by ADENE.

The technical requirement for specific training courses regarding the technical modules were defined by ADENE and in this framework, has also the responsibility to analyse the applications from universities or accredited training institutions for recognition requests to organize training courses. During this period, universities or accredited training institutions all over the country were accredited to lecture the technical modules. In statistical terms, from September 2007 to December 2012, the main figures are as follows:

Technical modules

- number of accredited training entities - 77
- number of carried out training courses for technical modules – 450

- number of trainees at the training courses for technical modules - 6350

Certification modules

- a team of trainers composed by 30 trainers
- number of carried out training courses – 120
- number of trainees at the training courses - 2600

After the conclusion, with approval at all the exams, the candidates should submit their applications, including training certificates and curricula vitae, to the respective professional associations in order to get recognition as qualified experts.

Once approved into the system, experts are introduced as such in the on-line central registry and gain access to issue the certificates, with their own username and password. By the end of 2012, more than 1700 Qualified Experts were available in the market.

It is predicted that the Qualified Experts' professional license is valid for only 5 years, and it is subject to renewal pending proof of continued training and absence of malpractice.

Training activity results and outputs: negative and positive aspects

The less positive aspects about the qualified experts training is that they cover essentially the regulation's thematic not focusing thoroughly on aspects such as best practices on energy and indoor air quality solutions available in the market.

As positive aspects, it should be highlighted the high level of training demand required to the qualified experts, that will assume the role of building's construction supervisor's in Portugal, assuring better construction in a more energy efficient way. Furthermore, making the training mandatory, provided professionals with a more similar level of expertise.

Training of energy managers of central administration buildings and facilities

Framework and legislative background

The National Action Plan for Energy Efficiency encompasses programs and measures considered essential for Portugal to meet the European targets. One of those programs is the Energy Efficiency Program in Public Administration ECO.AP that aims to achieve 30% energy efficiency by 2020, on agencies and departments of Public Administration, as well reduce gas emissions and establish a biggest stimulus into the economy through the creation of a legal framework of energy service companies (ESCOs). This program was launched through the Resolution of the Council of Ministers no. 2/2011.

In the framework of ECO.AP, there was one targeted to training of local energy managers (GLE); these technicians have the responsibility to support the implementation of ECO.AP and were selected by the several central public administration organisations.

Training of trainers and of energy auditors

The training courses for GLE were managed by ADENE with the financing of POPH, which was the programme which implements the thematic agenda for human potential inscribed in the National Strategic Reference Framework (NSRF), the programmatic framework document for the implementation of the economic and social cohesion community policy in Portugal for the period 2007-2013.

Aiming to provide the trainees with competences and qualifications in the field of energy management of buildings and equipment of the Public Administration, the training had the following structure:

- Geographical coverage – North, Centre, Alentejo and Lisbon regions
- Duration – from September 2013 to July 2014
- Number of training courses – 30, distributed by the regions above mentioned, which was attended by about 600 hundred trainees.
- Programmatic contents and duration of the training – with a duration of 5 days (40 hours), the programme include the following themes:
- programme ECO.AP
 - energy certification of buildings
 - energy concepts
 - energy characterization of the buildings
 - renewables (solar energy)
 - energy audits
 - energy efficiency plans
 - agreements for the management of energy efficiency and measurement and verification techniques.

Control and monitoring

The overall control of the training was based in an evaluation mechanism, direct and final, at three different moments: ex-ante, ongoing and ex-post.

4. SPAIN

1. EEV (ESCUELA DE ENERGÍA VERDE)

EEV is a non-formal training institution that focuses on renewable energies and energy efficiency. It provides an online platform where the information is constantly updated and available to those interested in clean and sustainable energies.

The institution intends to foster the interest on renewable energies and energy saving and efficiency, supported by quality training that is easily accessed and monitored by qualified professionals.

EEV is present in Spain and the Dominican Republic and provides online (e-learning and mobile learning) training solutions.

2. CHAMBER OF COMMERCE – REGIONAL DEVELOPMENT PLAN

The Chamber of Commerce and Industry of Seville (*Cámara de Comercio e Industria de Sevilla*) has set up a regional development plan³⁰ that fosters energy audits in SMEs and City Councils, under which it intends to achieve 20% to 30% energy savings, in compliance with the Europe 2020 Strategy and the Directive 2012/27/EU on energy efficiency.

The institution has a broad experience in collaborating with companies operating in the energy sector and has worked with the Andalusian Energy Agency³¹, government-owned entity assigned to the Regional Ministry of Economy, Innovation and Science, whose mission is to develop the policies of the Andalusian Regional Government aimed at optimising the energy supply of our region, from an economical and environmental point of view.

Under this plan, the Chamber of Commerce is responsible at a regional level for coordinating local energy policies, implementing the local energy optimisation plan, controlling audits prior to tenders related to energy services, controlling and managing tenders and the optimisation plan, and implementing local energy initiatives.

3. APADGE

APADGE³² (*Asociación Profesional Andaluza de Gestores Energéticos*) is the Andalusian Professional Association of Energy Managers and provides a set of services to its associates, including: training courses on energy efficiency (financed, online and introductory); monitoring and updating information on relevant aspects, such as the legal framework or tenders; consulting services related to energy efficiency, financing and technical assistance; events; workgroups to foster the exchange of experiences among professionals; and a section devoted to employment opportunities. The Association also provides specialised legal support or marketing solutions for the energy efficiency sector.

4. ENERAGEN

EnerAgen³³ is the Spanish Association of Spanish Agencies of Energy Management. It intends to be a structure that groups the common interests of Agencies of Energy Management at a national level, exchanging information and good practices and acting as a single voice, both national and internationally, for Spanish agencies working in the promotion of energy efficiency and renewable energies.

³⁰ <http://www.camaradesevilla.com/noticias/la-c%C3%A1mara-de-comercio-y-el-ayuntamiento-de-la-cabezas-firman-un-convenio-de-encomienda-de>

³¹ <https://www.agenciaandaluzadelaenergia.es/>

³² <http://www.apadge.com/>

³³ <http://www.eneragen.org/>

5. CONVENANT OF MAYORS

Covenant of Mayors (*Pacto de los Alcaldes*)³⁴ is the mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and use of renewable energy sources on their territories. By their commitment, Covenant signatories aim to meet and exceed the European Union 20% CO2 reduction objective by 2020.

For its unique characteristics - being the only movement of its kind mobilising local and regional actors around the fulfilment of EU objectives - the Covenant of Mayors has been portrayed by European institutions as an exceptional model of multi-level governance

6. ENFORCE PROJECT

ENFORCE³⁵ is a project funded by the European Union and aimed at contributing to overcome the not technological barriers obstructing the development of citizens' investments in the energy upgrading of the existing residential buildings.

Its main tool consisted in the creation of an Energy Auditors Network, composed by independent and professionally qualified experts, which consumers might address to for carrying out the Diagnosis and the Energy Certification of their houses.

It is the first and only Association operating on and targeting the energy sector in Spain, providing support and accrediting the associated energy managers, at the same time working towards the recognition and quality of the professionals devoted to energy efficiency.

7. STEEP PROJECT

STEEP³⁶ is a project co-funded by the European Union and coordinated by EUROCHAMBRES that intends to help about 600 small and medium sized enterprises (SMEs) in 10 different EU countries to save 10-15% of their energy costs in 3 years, through tailored training and guidance on effective energy management tools.

Additionally, pilot projects will be implemented in seven different countries across Europe, involving additional SMEs and setting up Local Energy Communities, shifting energy management from an individual approach to a collective one.

Even though the project is still being executed, STEEP is expected to contribute to the EU's goal of increasing energy efficiency by 2020, while at the same time providing European SMEs with an opportunity to make substantial savings and increase their competitiveness.

Spain participated in the project through the Chambers of Commerce (*Cámaras de Comercio de España*) - <http://www.camara.es/es/relaciones-institucionales/estudios-especificos/steep>

³⁴ http://www.covenantofmayors.eu/index_en.html

³⁵ <http://www.enforce-eeu.eu/eng/>

³⁶ <http://www.steep.eu/>

8. CHANGE PROJECT

CHANGE³⁷ is a project funded by the European Union and coordinated by EUROCHAMBRES that was developed during 2008 and 2010 and aimed at helping small and medium sized enterprises (SMEs) to optimise their energy use by developing a European network of Intelligent Energy advisors at Chambers of Commerce and Industry and by kick-starting/enhancing concrete assistance to SMEs.

The project involved 61 Chamber of Commerce and Industry (CCIs) from 12 European countries. CCI advisors were provided with training on energy efficiency and application of renewable energies, acting as a “first port of call” for SMEs in energy matters.

Spain participated in the project through the High Council of Official Chambers of Commerce, Industry and Navigation (*Consejo Superior de Cámaras Oficiales de Comercio, Industria y Navegación de España*) - <http://www.camara.es/>

9. AIRE PROJECT

AIRE³⁸ is a Transfer of Innovation project funded that intends to export the German Vocational Training course on “Assistant for Regenerative Energy techniques and energy management” to other European countries, namely Belgium, Denmark, Spain and Turkey. Partner countries have developed curricula or common modules that allow comparable and defined common quality standards.

The project is based on the fact that the EU countries will need well-trained technical staff to achieve Europe 2020 Strategy commitments and goals on energy reduction and efficiency, and intended to establish a common European AIRE standard which could be applied all over Europe. This standard should be easily transferable and recognized everywhere due to transparent assessment methods.

Spain was represented in the project through CENIFER (*Centro Nacional de Formación Profesional Ocupacional en Energías Renovables*), a professional training centre targeting professionals operating in the Renewable Energies and Energy Efficiency sectors.

³⁷ <http://ec.europa.eu/energy/intelligent/projects/en/projects/change>

³⁸ <http://www.egegroup.com/aire/index.php>

8. Conclusions and recommendations

1. INSTITUTIONAL LEVEL

The analysis of the overall situation led us to conclude that, in a certain dimension, the European Directive on Energy Efficiency and the obligation to develop energy efficiency plans permitted to identify some common points and initiatives in the participant countries.

MAIN OUTCOMES - relevant emerging scenarios resulting from national and EU initiatives

LEGISLATIVE FRAMEWORK

As expected, is very different in each participating country, but at least it was possible to state that the energy certification of buildings sector is somehow transversal, and special attention is being dedicated to this theme.

TRAINING SCHEME

- The situation is very diverse in each partner country, from the type of training to the qualification obtained, as well as the geographical coverage and entities responsible to deliver training; anyway, it was noticed a tendency to find somehow common points regarding the energy certification of buildings.

2. CONCLUSIONS: BARRIERS, GAPS AND GENERAL RECOMMENDATIONS

As general conclusion, it should be considered that due to the still existing differences among the partners countries as stated above and the lack of an EU professional (and training) standard, ENACT profile will be built with a modular approach of a professional family so that can be applied in the diverse context but still common (EU) frame.

Also how the application of UNI-EN 16247 will impact on the EA profile, both in terms of sectorial scope and of complexity scale.

1. ITALY

An important issue has to do with the lack of a common skills certification system in Italy, which could be useful in many different ways. For instance, in the case of 'greening' already existing job profiles, the existence of a skills certification scheme would represent the opportunity to acknowledge the acquisition of new green skills. The usefulness of this official acknowledgment is twofold: 1) a skills certification scheme would help define 'green workers' and, as a result, they could be the clear object of specific labour market policies/incentives; and 2) such a scheme would facilitate the mobility of workers across regions.

In the other hand, the most relevant issue which has not been properly addressed in Italy is the lack of a clear definition of the concepts of 'green sector' and 'green employment'. Traditional statistics do not allow the identification of a green sector and the corresponding green workers (as well as their characteristics, wage levels, etc.). Information on green employment is hence based on ad-hoc surveys, which may adopt different definitions of the green sector and green jobs. This represents a serious shortcoming since the absence of a common definition makes it difficult to carry out cross-national comparable analyses aimed at devising effective policies and evaluating their effects.

2. POLAND

In Poland, the system of training for energy auditors, both in the construction and industry sector is determined by the effect of education, ie the ability to realize an energy audit of the building or installation. The scope of this audits is given with the relevant regulations. The level of knowledge and skills in the field of energy auditing is very high and on the market there are high-quality experts in the area of thermo-modernization of buildings..

However, training programs, both in formal education (postgraduate) and non- formal is based legal records and do not go beyond that. This applies to both profiles developing energy audits for the needs of a refurbishment and energy certificate of the building.

Meanwhile, there is more and more demand on other skills, not included in the legal regulations that allow auditor for proper implementation of modernization measures and / or implementation of energy efficient solutions and renewable energy in housing construction. Among them they can be described broadly defined social or marketing skills, that allow for education and promotion of energy-saving solutions among investors.

Whether renovated or newly built house is the awareness of investor is insufficient and requires the assistance of a specialist at the stage of implementation of specific energy efficiency solutions. Meanwhile, the auditor prepared to develop audit does not necessarily have the skills and knowledge to implement these solutions. It demands a continuous retraining of the range of available, often innovative solutions for energy efficient construction both in terms of building design and installation on suppliers of media.

The development of energy auditing market tends to have more and wider competencies needed to perform various studies and services related to improving energy efficiency which expand energy auditor competencies to energy advisors.

3. PORTUGAL

In Portugal, there is a consolidated process for the training and qualification of energy auditor, namely at the building sector (residential and services). This was the result of several initiatives both from European Union and the Portuguese Government that was and is paying special attention to the energy sector, with focus on the energy efficiency and renewables.

Furthermore, it should be highlighted that the range of training was wide, as it covered not only the buildings, but also the industry and commerce, and was targeted to public and private sectors.

At that stage and taking in account the experience acquired and the lessons learnt, it should be noticed that the follow up and continuation of all this process is being made through the launch, in 2014, of a new initiative from the Portuguese Government - Portuguese Coalition towards Green Growth. This initiative aims *“to assure simultaneously a long-term trajectory of budgetary responsibility, to fulfil a new agenda on structural reforms, and to provide selective and reproductive investments in areas that constitute the main driving forces of growth – knowledge, green economy and industrial policy”*. In this framework, and regarding the energy theme, it should be featured two facts:

- **Renewable energies** – Portuguese target for 2020 aims to reduce external energy dependence and reinforce security of supply, be positioned in the top rank of climate change initiatives and promote economic growth.
- **Energy efficiency** – the new energy efficiency strategic plan has the objective to reduce in 25% the consumption of primary energy by 2020.

In order to accomplish with the targets above mentioned, it is forecasted and mandatory to reinforce the training to improve the competences and qualifications of human resources in all activity sectors, towards to economic green growth and green job creation. This is the main recommendation.

4. SPAIN

The Spanish Law, as well as regionally in Andalusia, foresees the figure of the energy manager. Furthermore, the Spanish National Institute for Qualifications (*INCUAL - Instituto Nacional de las Cualificaciones*) set the national professional qualification framework for training related to energy efficiency.

Indeed, existing degrees leading to a qualification related to energy management are of Level 3 (VET) and higher. Furthermore, Level 3 qualifications provide graduates with a professional certificate (*Certificados de profesionalidad*): an official instrument of accreditation of a professional qualification from the National Catalogue of Professional Qualifications. These certificates accredit a set of professional competences that qualify a professional to exercise a professional activity identified in the National Catalogue of Professional Qualifications.

Nevertheless, this certificate can also be awarded to experienced professionals, thus accrediting their professional experience, which we consider to be of high importance for this sector. Especially considering that the current training and qualification scheme does not take into account professional experience.

The main conclusion to be draw is that Level 3 qualification allows the access and is adequate to the profession of energy manager, even more so when considering the possibility of recognition of a profession from the National Catalogue of Professional Qualifications.

However, for professional courses there is not an official national certification provided by the State that assures the quality and professional recognition of such training, which results in an unregulated sector.

Indeed, one can only find private companies teaching courses in the area of energy efficiency and there is no national certificate to accredit these professionals. This means that professionals currently working in this field are not required to possess any specific training, resulting in a major barrier to the nationwide certification and recognition of the profession.

Therefore, it is clear that there is an urgent need for homogenisation in this unregulated sector. This is even more important when we acknowledge the fact that are several organisations (public and private) trying to regular, foster or frame the figure of the energy manager and the rising importance of this professional profile due to the European objectives and policies.

Since there is a legal and professional qualification framework in Spain, the most important question lies in its applicability and certification and accreditation by the State.

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O1 Energy auditors competences and professional profiles

O1A2 – Professional profiles definition and competences matrix

Project Title	Energy Auditors Competencies, Training and Profiles
Acronym	ENACT
Grant Agreement Number	2014-1-IT01-KA202-002672
Deliverable Number	O1A1
Deliverable Name	Comparative Research Report
Date of Delivery	Rev. 0 - 12/02/2015 Rev. 1 - 24/02/2015 Rev. 2 - 6/03/2015
Author(s): Person Name / Partner	Valentina Castello / Marina Varvesi AISFOR Diogo Beirao / ADENE

10. Building a common profile

MATRIX - Complexity scale 3 different professional "families":

Qualification	Activities	Sub Activities	SECTOR	COMPETENCES
Energy manager Expert in energy management Local energy manager Energy manager	Auditing Monitoring Management Planning	Models and tools Systems Implementation of regulations and measures Energy plan implementation and monitoring	Buildings of the residential, industrial and tertiary sector	<ul style="list-style-type: none"> analysis of energy flows promotion of energy efficiency measures support to the management board and policy makers to pursue a sustainable development technical expertise expertise in environmental matters, business management and communication responsible for the energy management of the facilities and buildings of each entity or service of the public administration combines the identification of opportunities to reduce energy expense, the design and implementation of solutions

<p>Qualified Expert on energy certification of buildings</p> <p>Energy certification assessor (or energy certifier)</p> <p>Energy certifier</p>	<p>Auditing</p> <p>Certification</p>	<p>Identification of measures for energy efficiency</p> <p>Compliance with legislation</p> <p>Issue of energy performance certificates</p>	<p>Buildings of the services and residential sectors</p>	<ul style="list-style-type: none"> responsible for the issue of energy performance certificates and to carry out inspections to the buildings to perform an energy audit of the building and to issue the energy performance certificate a professional to prepare energy performance certificates for buildings
<p>Energy auditor</p> <p>SGCIE auditor</p> <p>Energy consultant or adviser</p> <p>Energy efficiency auditor</p>	<p>Auditing</p> <p>Monitoring</p> <p>Management</p> <p>Planning</p>	<p>Models and tools</p> <p>Systems</p> <p>Implementation of regulations and measures</p> <p>Energy plan implementation and monitoring</p>	<p>Buildings, transport, industry, services and public and local administration</p>	<ul style="list-style-type: none"> identifies and describe the situation of the installation analysed responsible to monitor and to ensure the accomplishment of mandatory commitments of the facilities and installations with intensive energy consumption. design and implementation of solutions to achieve a reduction on energy expense and carbon footprints. knowledge and skills to analyse energy efficiency in a transversal way (energy efficiency in buildings, installations,

				industrial processes)
Heating system inspector	Inspection	Analysis and inspection of equipment	Buildings of service sector and industrial facilities	<ul style="list-style-type: none"> Responsible for performing energy efficiency checks on heating/cooling systems.
RES installer	installation	Installation of renewable energy sources equipment and systems	Buildings of the services and residential sectors	<ul style="list-style-type: none"> installation of renewable energy sources facilities: <ul style="list-style-type: none"> boilers and biomass stoves or photovoltaic systems solar heating systems heat pumps, or shallow geothermal systems

The analysis of the different professional qualifications in the participating countries, permitted to identify the main common activities and sub activities between them, which are auditing, monitoring, management, certification (energy performance certificates), implementation of regulations and measures and identification of measures for energy efficiency. All these activities and sub activities came from a list of qualifications derived from the national qualification frames at each partner country level and has represented the basis of a proposal to the qualification compared matrix. According to the project aims (and its valorization) as well as to the institutional architecture of the qualification system, at the Italian level Energy Auditor – related qualification definitions have been analysed of 9 regional repertoires, as follow¹:

1. **Lazio** (Technician expert in energy management; Technician for energy solutions of integrated building system)
2. **Lombardia** (Energy manager)
3. **Toscana** (Technician of design and development of energy-saving systems)
4. **Puglia** (Technician of design and development of energy-saving systems)
5. **Sardegna** (Technician of design and development of energy-saving systems)
6. **Emilia Romagna** (Technical expert in energy management; Technician for energy solutions of integrated building system)
7. **Piemonte** (Technician of energy efficiency in the sustainable buildings system; Technician for the management and assessment of the energy system, Technician for the energy supply and plant construction)
8. **Liguria** (Technician of energy efficiency of existing buildings; Expert in Energy Management)
9. **Campania** (Project Manager of Renewable Energy)

	Activities Area	Activities	EA (UNI CEI EN 16247)	EME (UNI CEI 11339)	Knowledge	EA (UNI CEI EN 16247/5)	EME (UNI CEI 11339)	Skills	EA (UNI CEI EN 16247/5)	EME (UNI CEI 11339)	Competences	EA (UNI CEI EN 16247/5)	EME (UNI CEI 11339)
Management	Promotion of energy efficiency measures (including the renewable)	Assessment of available alternatives (including renewable resources)			Knowledge of "traditional" and renewable energies	X	X	Technical expertise	X (UNI EN 16247 - 1,2,3,4)	X	Perform a technical-economic analysis of energy efficiency measures implementation	X	X
			X	X	Knowledge of market performance in the different rates and existing costs sections	X		Development of technical-economic study	X	X	Determine effectiveness improvements	X	X
					Knowledge of technical solutions		X	Technical skills in calculation of useful energy; calculation of savings	X	X	Analyse and compare energies		
		Energy costs definition / calculation			Knowledge of energy measures/solutions and costs	X	X				Financial assessment	X	X
			X	X							Definition (and agreement with client) of the energy	X	X

											and economic savings		
		Energy measures, solutions and costs	X	X	Knowledge on how the energy market (and suppliers), of the retail companies and the methodology to switch between companies	X	X						
		Elaboration of energy saving plans and systems Planning energy efficiency measures	X	X				Compare the different energies or companies	X	X	Simulate economic savings between the different energies and companies	X	X
		Energy / costs saving definition / calculation	X	X	Knowledge on energy measures/solutions	X	X	Reporting	X	X	Business orientation		X
		Definition of the measures to improve the integrated energy	X	X	Basic knowledge of technical solutions applicable to all areas	X	X	Skills to determine the best available techniques (amongst those existing) to suit the client's	X		Evaluate current installations and compare them with viable solutions	X	X

		performance Set up the technical solutions for the integrated energy performance improvement						needs according to the implementation and location techniques, and performance. Ability to propose and receive from the client objectives for the energy and economic savings					
		Communication (plan and tools) definition			Marketing knowledge	X	X	Negotiation and communication skills	X	X	Definition of appropriate strategy	X	X
			X	X	Knowledge of marketing based on energy savings and sustainable solutions Knowledge of verbal and physical communication methodologies	X	X	Use of IT communication tools Communicate technical solutions Verbal and not verbal communication methodologies	X	X	Plans and results communication	X	X
					Energy and environmental	X	X	Reporting	X	X	Business orientation		X

					legislation and incentives								
		Evaluation of the incentives/law	X	X	<p>Knowledge of local, regional, national and European institutions that provide grants or subsidies</p> <p>Knowledge of procedures to request subsidies</p> <p>Knowledge of advantages and disadvantages of possible grants</p> <p>Knowledge of legislation applicable to each energy and application</p>	X (not specify in a direct manner, but it can be included in knowledge of policies/ rules/ regulations)	X	<p>Detect the most interesting grants to execute or implement one or several solutions</p> <p>Interpret regulations and their applicability in each case</p>	X	X	<p>Grants requests and management (including administratives and technical aspects)</p> <p>Monitoring the evolution of regulations and their impact on energy consumption, sustainability, costs and safety</p>	X	X
Auditing	Technical and		X	X	Knowledge of technical issues,	X	X	Equipment and ICT	X (EQUIPMENT IN)	X	Analyse data from monitoring systems		X

	economical auditing	Collection of energy historical consumptions			regulations and legislation				GENERAL; ICT IS NOT MENTIONED)		Analyse energy bills		
					Knowledge of production, control, communication, circulation, lighting, ventilation systems								
		Monitoring the existing facilities Diagnosis of energy context Representation of the energy situation of the integrated building system	X	X	Knowledge of technical tools to conduct an audit or data registry Ability to assimilate energy consumption habits Ability to estimate consumption behaviours and cost	X (Included in technical knowledge)	X	Interpretation of data collected Simulation of consumption and cost according to the data collected and current energy costs Comparison between different rations (from the client and the sector)	X	X	Define energy consumption indicators	X	X
			X	X	Knowledge of technical issues,	X	X	interpretation of indicators, standards and rules /	X	X	Analyse the results of simple energy audits	X	X

		performance indicators			regulations and legislation			regulations / legislation					
		identification of energy efficiency measures and the use of renewable energy	X	X	Energy measures / solutions	X	X				Financial assessment	X	X
		Energy costs definition / calculation and energy saving	X	X	Energy measures/solutions and costs	X	X	Reporting	X	X	Business orientation		X
		Identification of opportunities to reduce energy expense (incentives)	X	X	knowledge on the incentives and technical knowledge	X	X	Incentive application	X (not specified directly but deductible)	X			
Planning	Economics And Performance	Verification of the budget availability		X	Knowledge on economical, financial			Technical expertise on plan and analysis of energy audits			Economical and financial assessment	X	X

	Planning and Control	against the costs			and organisation planning			results, as well as equipment and ICT					
		Collection of information on external conditions	X	X	Knowledge of processes for the implementation of technical solutions			Define and evaluate the attainable savings levels			project management Design of energy efficiency plan based on savings, investment and importance for the client Organisation of actions according to priorities (economic, technical, social,...)		
		Elaboration of energy saving plans (UC 288)	X	X	Knowledge of processes for amortization according to the savings and investment			Define and select measures applicable within the optimal period of amortisation					
		Design of energy saving systems (UC 289)	X	X		X	X					X	X
		Planning energy efficiency measures											
		Planning of the energy efficiency measures implementation	X	X					X	X			

		Definition of the measures to improve the integrated energy performance	X	X									
		Set up the technical solutions for the integrated energy performance improvement											
		Implementation		X									
Monitoring	Monitoring	Verification of the energy consumption		X	Knowledge of technical and technological solutions to perform a monitoring process of electric and thermal consumption		X	Utilization of equipment and ICT Interpretation of results from monitoring processes Interpretation of deviations on the		X	Energy Management Plan implementation monitoring Creation of behaviour profiles Selection of applicable measures to bridge the gap		X

					Knowledge of the applications to act on monitoring systems and data collection Knowledge on the interpretation of results according to the logical, real and proposed consumption			functioning of consumption and logical or desired cost Creation of profiles for optimal functioning			between current and desired (or more efficient) profiles		
					Knowledge of technical issues, monitoring processes, regulations and legislation			Equipment and ICT		X	Energy Management Plan implementation monitoring		X
		Support and supervision		X			X	Monitoring and reporting skills		X	social, team working, performance management/assessment		X
		Statement of the improvement performance		X				Monitoring of processes or action necessary to achieve the objectives set-up		X	Project management		X

		energy plan(and report the actual EE and cost reduction)											
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The O1A2 matrix represent the conceptual and operative frame for defining:

- the perimeter of **ENACT energy auditor professional profile and curriculum**, as in the following project intellectual output (O2);
- an **ECVET based modular learning program, system and resources** (IO3), thanks to the analytical definition of learning outcomes, expected performance and evaluation system for each component (activity and sub-activity) of the professional profile. This approach will also allow to implement a multiplier impact and valorization at each regional and national level (as well as cross sectoral), allowing a clear definition and comparison of “curriculum” bricks of the Enact Energy auditor;

consistently to the previous point, a common energy auditing and management **European job market and learning space** for all the relevant sectors (residential, public building, companies).

11. ANNEXES

ANNEX 1 Comparative Matrix

ANNEX 2 Italian National Report and matrix

ANNEX 3 Polish National Report and matrix

ANNEX 4 Portuguese National Report and matrix

ANNEX 5 Spanish National Report and matrix

ANNEX 1 Comparative matrix

O1 - MATRIX for energy auditor competences and profiles	COUNTRY			
	ITALY	SPAIN	PORTUGAL	POLAND
INSTITUTIONAL FRAMEWORK	Europe 2020 Strategy National Plan for Energy Efficiency 2014	Europe 2020 Strategy National Plan for Energy Efficiency	<p>National action plan on energy efficiency (PNAEE 2013-2016)</p> <p>National action plan on renewable energies (PNAER 2013-2020)</p> <p>National climate change programme (PNAC 2020)</p> <p>National action plan on energy efficiency (PNAEE 2013-2016)</p> <p>National action plan on renewable energies (PNAER 2013-2020)</p> <p>National climate change programme (PNAC 2020)</p>	

<p>LEGISLATIVE FRAMEWORK</p>	<p>Energy Auditor: Legislative Decree 102/2014;</p> <p>Energy manager: Law 10/1991 ; Legislative Decree no. 192/2005; Legislative Decree 311/2006; Ministerial Decree 21/12/2007; Legislative Decree 115/2008</p> <p>Expert in energy management: UNI CEI 11339 standard;</p> <p>Heating system inspector: Legislative Decree 192/05, Presidential Decree No 74/2013</p> <p>Energy Certifier: Legislative Decree 192/2005; Presidential Decree No 75 of April 16th 2013; decree "Italy destination" modified by the law February 21st, 2014</p>	<p>Spanish Law 235/2013; Directive 2012/27/EU (not transposed); Spanish Law 1177/2008</p>	<p>Expert on energy certification of buildings:</p> <p>1) Decree-Law n.º 118/2013, of 20 August, with 3 regulations:</p> <ul style="list-style-type: none"> • System of energy certification of buildings • Regulation of HVAC systems • Regulation of thermal behaviour <p>2) Law n.º 58/2013, of 20 August - regulates the access to the activity of the expert on energy certification of buildings</p> <p>3) Ordinance no. 66/2014, of 12 March - establishes the thematic contents of the exam for the expert on energy certification of buildings</p>	
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			<p>Local energy manager</p> <p>4) Resolution of Cabinet Council no. 2/2011</p> <ul style="list-style-type: none"> - Resolution of Cabinet Council no.93/2010 – development of tools for climate changes politics. - Decree-Law no. 29/2011, of 28 February, legal framework of the energy efficiency management <p>SGCIE Auditor</p> <ul style="list-style-type: none"> - Decree-Law no. 71/2008 - facilities and installations with intensive energy consumption <p>Expert on energy certification of buildings</p> <p>1) Decree-Law n.º 118/2013, of 20 August, with 3 regulations:</p> <ul style="list-style-type: none"> - System of energy certification of buildings 	
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			<ul style="list-style-type: none"> - Regulation of HVAC systems - Regulation of thermal behaviour <p>2) Law n.º 58/2013, of 20 August - regulates the access to the activity of the expert on energy certification of buildings</p> <p>3) Ordinance no. 66/2014, of 12 March - establishes the thematic contents of the exam for the expert on energy certification of buildings</p> <p>Local energy manager</p> <p>1) Resolution of Cabinet Council no. 2/2011</p> <ul style="list-style-type: none"> - Resolution of Cabinet Council no.93/2010 – development of tools for climate changes politics. - Decree-Law no. 29/2011, of 28 February, legal framework of the energy efficiency 	
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			<p>management SGCIE Auditor - Decree-Law no. 71/2008 - facilities and installations with intensive energy consumption</p>	
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TRAINING SCHEME	Training scheme for energy manager (1) Training scheme for expert in energy management (2) Training scheme for heating system inspector (3) Training for energy certifier (4)	Higher Education; Vocational Training; Private non formal training	Expert on energy certification of buildings	
Structure and methodology Course energy auditor residential Structure and methodology Course energy auditor residential			Training is not compulsory, but the candidates should comply with specific and mandatory requisites as established by Law no. 58/2013, of 20 August.	
Geographical coverage (National/Regional)	National	National	National	

<p>Type of training</p>	<p>professional training and refreshment courses on energy management professional training and refreshment courses on energy management professional training and refreshment courses on energy management professional training and refreshment courses on energy management</p>	<p>Vocational Training</p>	<p>Not applicable, but there is an offer of voluntary training courses from several entities</p>	
<p>An official authorization to perform training courses is needed (yes or no)</p>	<p>Yes</p>	<p>Yes</p>	<p>no</p>	

if yes, list the institution and describe the process briefly	Institutions must be accredited by the Government/ Certification entities. (i.e. courses organised by ENEA and Fire)	Institutions must be accredited by the Government to teach		
Access requirements (i.e., academic degree or level of education)	Technical - scientific background	Direct access or admission test	<ul style="list-style-type: none"> - degree on engineering or architecture - 5 years of professional experience on activities related to buildings construction and/or project - Approval on an exam provided by ADENE - degree on engineering or architecture - 5 years of professional experience on activities related to buildings construction and/or project - Approval on an exam provided by ADENE 	

<p>Programmatic contents (syllabus)</p>	<p>Energy Manager – Industrial Sector. Contents: The role of the energy manager. Energy accounting, economic analysis of energy saving. Specific features of energy management in various industrial sectors. Energy diagnoses and data transmission forms for the Ministry of productive Activities. Heat recovery; recovery of materials and waste management. Electric lines and engines, power factor correction; heat pumps, refrigeration systems. Regulations.</p> <p>Energy Manager – Tertiary, Residential and Local</p> <p>Authorities Sector. Contents: The role of the energy manager. Energy accounting, economic analysis of energy saving. Heat requirement and environmental wellbeing; heat production and regulation; system solutions; energy saving and maintenance initiatives.</p>	<p>Thermal equipment and installations; Installation processes; Graphical representation of installations; Energetic efficiency of installations; Facilities' energy efficiency; Buildings' energetic certification; Efficient water management in edification; Thermal solar facilities configuration; Assembly and maintenance management of thermal solar facilities; Efficient use of water and energy promotion; Energy efficiency and solar thermal energy projects; Career guidance; Entrepreneurship;</p>	<ul style="list-style-type: none"> - System of Energy Certification of Buildings - Thermal behaviour of buildings - Thermal inertia - Efficiency of technical systems - Annual nominal needs of energy for heating or cooling - Preparation of sanitary hot water (SHW) - Calculation of annual global needs of primary energy - Small buildings for commerce and services - System of Energy Certification of Buildings - Thermal behaviour of buildings - Thermal inertia - Efficiency of technical systems - Annual nominal needs of 	
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	<p>Environmental cooling and use of heat pumps, cold production; cogeneration; rationalisation of electricity consumption. Energy management of real estate holdings.</p> <p>Energy service contracts. Cost effectiveness of interventions.</p> <p>Self-diagnosis forms. Software for energy assessments.</p> <p>Economic assessments for energy rationalisation initiatives.</p> <p>Energy management - local authorities (local councils, provinces, regions): control and checks of heat producing systems and local energy programmes.</p> <p>Energy Manager – Healthcare and Hospital Sector. Contents: The role of the hospital energy manager; energy features of hospitals; recording of systems and general energy accounting. Environmental comfort; combustion technologies; power plants, primary distribution and sub-plants;</p>	<p>Internship in workplaces</p> <p>Thermal equipment and installations;</p> <p>Installation processes;</p> <p>Graphical representation of installations;</p> <p>Energetic efficiency of installations;</p> <p>Facilities' energy efficiency;</p> <p>Buildings' energetic certification;</p> <p>Efficient water management in edification;</p> <p>Thermal solar facilities configuration;</p> <p>Assembly and maintenance management of thermal solar facilities;</p> <p>Efficient use of water and energy promotion;</p> <p>Energy efficiency and solar thermal energy projects;</p> <p>Career guidance;</p>	<p>energy for heating or cooling</p> <ul style="list-style-type: none"> - Preparation of sanitary hot water (SHW) - Calculation of annual global needs of primary energy - Small buildings for commerce and services 	
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	refrigeration plants and heat pumps; construction coverings and air treatment. Heating and air-conditioning; local power generators; rationalisation of electricity consumption; illumination, supervision, remote management and control systems; Regulations and contracts.	Entrepreneurship; Internship in workplaces		
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Evaluation (exam) of trainees (yes or no)	no	Yes	yes	
Qualification/certification obtained (level)	Certificate of attendance	Superior-level Cycle on Energy Efficiency and Solar Thermal Energy (<i>Técnico Superior en Eficiencia Energética y Energía Solar Térmica</i>) Superior-level Cycle on Energy Efficiency and Solar Thermal Energy (<i>Técnico Superior en Eficiencia Energética y Energía Solar Térmica</i>)	Expert for the energy certification of residential sector and small service buildings (PQ-I)	

(Acquired) competences	Promote, identify and implement improvements to energy efficiency	Assembling and evaluating the efficiency of energy and water installations, technically supporting the energy certification process of buildings	to ensure that the buildings comply with the technical requisites of the regulation (Decree-Law n.º 118/2013, of 20 August), to issue the energy performance certificates and carry out inspections	
Structure and methodology Course energy auditor non-residential			Training is not compulsory, but the candidates should comply with specific and mandatory requisites as established by Law no. 58/2013, of 20 August.	
Geographical coverage	National	National	National	

(National/Regional) (national/regional)				
Type of training	VET	Private non formal training	Not applicable, but there is an offer of voluntary training courses from several entities	
An official authorization to perform training courses is needed? (yes or no)	yes	No	no	

<p>If yes, list the institution and describe the process briefly</p>	<p>TUV Italia http://www.tuv.it/it-it/attivita/certificazione-del-personale/esperto-in-gestione-dell39energia-ege; Certiquality http://www.certiquality.it/ege; Khc http://www.khc.it/?m1=4&m2=77&lang=ita&cartel=Schemi_di_Certificazione; ENIC srl http://www.enteitalianocertificazione.it/; SECEM www.secem.eu/ (enti certificati da ACCREDIA) CERTIFIED BY ACCREDIA</p>			
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<p>Access requirements (i.e., academic degree or level of education)</p>	<p>5 years degree in technical-engineering topics plus 3 years of experience in the field of energy management;</p> <ul style="list-style-type: none"> • 3 year Degree in technical-engineering topics plus 4 years of experience in the field of energy management; • technical diploma or degree in different subjects and at least five years of experience in the field of energy management; • for all other 10 years of experience in the field of energy management. 	<p>Academic degree</p>	<ul style="list-style-type: none"> - degree on engineering - 5 years of professional experience on activities related to buildings construction and/or project of HVAC systems and/or energy audits - Approval on an exam provided by ADENE 	
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<p>Programmatic contents (syllabus)</p>	<p>Continual analysis of the energy system Introduction and/or development of energy policy and internal management systems according to ISO 50001 Energy Accounting-Energy audits and feasibility studies- Contracts - Conducting awareness and promotion programs Defining specifications for energy contracts Energy and financial planning - Management of the energy system - Report to management</p>	<p>Methodology for energy audits; Measurement devices; Analysing energy audit's results; Efficiency measures in buildings; Tools for energy audits; Energy services companies; Case studies. Methodology for energy audits; Measurement devices; Analysing energy audit's results; Efficiency measures in buildings; Tools for energy audits; Energy services companies; Case studies.</p>	<p>- System of Energy Certification of Buildings - Regulation of HVAC systems - Requisites of buildings thermal envelope - Requisites of the technical systems - Requisites and strategies for ventilation - Methodologies for the calculation of energy efficiency indicators - Systems for regulation and technical management - Commissioning of equipment and facilities - Maintenance - Case studies</p>	
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evaluation (exam) of trainees (yes or no)	yes	Yes	yes	
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<p>Qualification/certification obtained (level)</p>	<p>The evaluation process begins with the verification of documents proving adequate professional experience in the energy sector and continues with the assessment of skills. The process is periodic with a maximum interval between assessments of 5 years. It can be a self-assessment (first party certification), an assessment by the organization in which the candidate EME works (second party certification), or an assessment by third party (third party certification). In the latter case the third party must operate according to the requirements of ISO 17024.</p>	<p>Energy auditor in the building sector (<i>Auditor Energético en Edificación</i>) and regarding chief energy auditor in the building sector (<i>Auditor Energético Jefe en Edificación</i>)</p>	<p>Expert for the energy certification of non residential buildings sector (PQ-II)</p>	
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<p>(Acquired) competences</p>	<p>Competence in hold correctly a discussion of thematic topics, such a sectoral legislations, various technical aspects of energy and its impacts, energy management systems and related disciplines, systems of standardization, certification and accreditation, the European Union directives on the rational use of energy, with particular reference to the main directives and national laws, regional and other applicable, etc. Competence in energy audit and in energy management planning; Expertise in project managing; Competence in communication and reporting.</p>	<p>Energy diagnosis, energy audits</p>	<p>to ensure that the buildings comply with the technical requisites of the regulation (Decree-Law n.º 118/2013, of 20 August), to issue the energy performance certificates and carry out inspections</p>	
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Structure and methodology Course local energy manager		EEV (Escuela de Energía Verde);		
Geographical coverage (National/Regional)	National	ENFORCE project;	national	
Type of training	qualification training	APADGE (Asociación Profesional Andaluza de Gestores Energéticos);	The training was mixed, i.e., at a classroom and e-learning	
An official authorization to perform training courses is needed? (yes or no)	Yes	STEEP project;	yes	

If yes, list the institution and describe the process briefly	Tre presidential decree 74/2013 states that ENEA is in charge to organise courses for heating system inspectors and to support Regions and autonomus Provinces in training activities.	CHANGE project;	The training of Local Energy Manager is regulated by the Resolution of Cabinet Council no. 2/2011 which established ADENE as the entity responsible for this activity.	
Access requirements (i.e., academic degree or level of education)	University technical degree or a high school technical diploma plus two years' relevant work experience	Chamber of Commerce and Industry of Seville (Cámara de Comercio e Industria de Sevilla);	staff of public central state administration	

<p>Programmatic contents (syllabus)</p>	<p>Legislative framework for heating and cooling systems; existing typologies of plants; technical standards; energy building certification; energy saving solutions on thermal plants; Elements of heating technology; Combustion Techniques for heating water ; Control and safety device;s Techniques for system regulation; Techniques for checking pollution emissions; Techniques for analysing energy consumption; Sector regulations; Elements of heating system maintenance.</p>	<p>AIRE project.</p>	<ul style="list-style-type: none"> - programme ECO.AP - energy certification of buildings - energy concepts - energy characterization of the buildings - renewables (solar energy) - energy audits - energy efficiency plans - agreements for the management of energy efficiency and measurement and verification techniques 	
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Evaluation (exam) of trainees (yes or no)	yes		no	
Qualification/certification obtained (level)	certificate		energy auditor of buildings and equipment	
(Acquired) competences				
Structure and methodology (energy certifier course)			Information inserted in the National Report	
Geographical coverage (National/Regional)	regional			
type of training				

<p>An official authorization to perform training courses is needed? (yes or no)</p>	<p>yes</p>			
<p>If yes, list the institution and describe the process briefly</p>	<p>At national level the training institutions (such as universities, research bodies and agencies and professional bodies and councils) have to be authorised by the Ministry of Economic Development and at regional level the training institutions have to be recognised by the Regions and Autonomous Provinces, or by other regional-level authorised bodies.</p>			

Access requirements (i.e., academic degree or level of education)	It depends on the Region. For Regions that haven't already legislated, the National Reference is the Decree 75/2013 and subsequent amendments. See details in energy certifier map.			
Programmatic contents (syllabus)	It depends on the Region. For Regions that haven't already legislated, the National Reference is the Decree 75/2013 and subsequent amendments. See details in energy certifier map.			
Evaluation (exam) of trainees (yes or no)	It depends on the Region. See details in energy certifier map.			
Qualification/certification obtained (level)	building energy certifier			

(Acquired) competences	Competence to carry out an energy assessment on the building and produce an EPC and recommendation report following the assessment.			
BEST PRACTICES	LINKS to projects LINKS to TRAINING MPAS REPORTED IN THE IT REPORT(Vet & IFP; EA; certifier)			