O4 – ENACT RECOMMENDATIONS

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1. INTRODUCTION

1.1 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 programs 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 ECVET[1] (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.

ENACT background 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 Europe2020[2] strategy, as recalled

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

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

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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 (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 - 20[5] strategic goals and the NZEB[6].

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.

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

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

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Project activities **have been related to the realization of:**

- **Four intellectual outputs** (as in the picture)
- **Multiplier events** (2 in each partner countries) and one final conference.
- **Transversal activities** related to general dissemination and valorization, supporting project result development as well as their impact and sustainability.

All ENACT outputs and relevant results can be found at the project website www.enactplus.eu and in the dissemination platform.

1.2 ENACT Recommendations overview

This "Recommendations" document is produced within the ENACT project (Energy Auditors Competencies, Training and profiles) to contribute to the definition and implementation of a **common framework** for the **professional qualification and competences of energy auditors**.

More specifically, ENACT recommendations aim to deepen the analysis of the main ENACT project results and outputs as a basis for further building and valorizing a common framework within energy efficiency related **job markets** and related **education and training systems and curriculum**.

This report includes the ENACT experiences and results achieved to provide, on both national and European levels, recommendations and guidelines for managing the opportunities and challenges brought about by the environmental changes through implementing a multi-actor governance model (business, institutions, VET) and common qualification (and validation) frameworks, to foster flexibility, employability and mobility.

These recommendations aim to evaluate the main ENACT project results as a basis for building a common framework within energy efficiency education and its related job market.

More specifically:

- **ENACT profile and qualification scheme** were prepared as part of the project activity "O2 - ENACT program and learning resources" (related project documents can be found at the project website www.enactplus.eu). ENACT qualification scheme recommendations have been built on a cross-sectorial and geographical terms taking into account: Job market opportunities (depending in turn on sector scenarios); Competences demand and supply matching. The main valorisation activities related to the ENACT qualification scheme are related to:

ENACT profile and qualification scheme valorisation

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- **cross national transfer**, by sharing the profile with other EU countries. This in turn will sustain not only the development of common European job market segments but also the potential valorization of ENACT training and systems (enhanced by the sharing of the qualification schema);
- **integration within regional and national qualification frames**, taking into account, although in a common EQF frame, the different repertories architectures;
- **integration within the European** (and national) standards related to the **Energy Auditor**, such as the **UNI CEI EN 16247** (with special reference to the Chapter 5).

All integration directions have been grounded on both desk and in field activities and:

- developed taking into account both the focused profile of the private residential energy auditor and the enlarged professional family related to energy management and efficiency in the overall buildings sectors;
- have been related to dedicated actions realised within the project timeline (first within research and then within valorisation processes) as well as to specific recommendations or valorisation actions to be further implemented at each national and EU level.

The relevant ENACT scenario has been built and related to the enhancement of its (actual and future) job market potentials by the implementation of specific actions on the regulatory, programmatic and policy scenarios on both:

ENACT Policy reccomendations

- job **demand** (positive and negative system incentives influencing the demand for energy auditor services and competences)
- and job **supply** (quality of professional systems and related education and training systems, as well as the harmonization of the qualification frameworks) **perspective**. These aspects have been developed within the overall policy recommendations, influencing the valorisation processes (and potential impacts) of all three ENACT main outputs/results (qualification schema; program and resources; technology enhanced learning system), as reported later in the document.

- **ENACT training program and resources** valorisation has been, consistently, built taking into account, with a both European and national perspectives, the evidences emerging from:
  - the main scenarios elements as well as the (previous) **qualification schema valorisation** analysis, and the related paths of valorisation in a cross-sectorial and/or cross-geographical perspectives, as above recalled for the qualification schema;
  - the relevant **scenarios in terms of both sector/job market and of education and training systems** and curriculum, also taking into account the potentials related to the policy recommendations actions as well as the enlargement of the ENACT focus to complementary / connected professional profiles and/or professional areas, scopes and sectors;

ENACT program, resources and system

  - the main evidences of the **ENACT piloting action** and its evaluation related project documents are available in the project website www.enactplus.eu).

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This last point has been developed thanks to the modular and learning outcomes - driven approach to the ENACT profile, curriculum and program definition (related project documents are available in the project website www.enactplus.eu). The application of both the EQF and ECVET frames allow to reinforce even more this valorisation path, both at national, cross-national and EU levels. The ENACT approach has allowed partners to:

Enlarging ENACT scope

- define and share a matrix correlating **ENACT related professionals in the area of energy efficiency services sector and the relative competences mix**;
- link the program and learning resources valorisation to the overall **ENACT system** one (descriptions of both ENACT system and the ENACT overall validation are related to the IO3 and can be found at the project website www.enactplus.eu).

The document is structured in three main sections.

The first (Chapter 2) on "THE FUTURE OF ENERGY AUDITING: SCENARIO ANALYSIS" gives a short overview of the current situation of national markets of partner countries in the areas important for the future development of the ENACT energy auditor. It includes general conclusions useful for other European countries in investigating their own market conditions. Consistently, it focuses on the main scenarios, both at each national and European level, relevant to the professional development of the energy auditor and related job market opportunities (depending in turn on sectorial and institutional dynamics, including the policy dimensions and the incentive system promoting the ENACT profile job demand). To this extent, and according to project scenarios and goals, this section also proposes "policy level" Recommendations focusing both **demand and supply factors which may strongly influence the ENACT Energy Auditor job market (and related professional and training needs**).

Document structure

Within this scenario and Recommendations, the second section (Chapter 3) deals with the effective implementation and valorization of common energy auditor qualification scheme (and related professional systems), also in terms of dynamic integration within European professional standards. The chapter on "RECOMMENDATIONS FOR EFFECTIVE IMPLEMENTATION OF THE ENACT ENERGY AUDITOR QUALIFICATION SYSTEM" aims to evaluate the Qualification Scheme for Energy Auditor prepared in the project, it includes the most important aspects of implementing the ENACT qualification scheme in partner countries and as European level common profile, as possible follow-up of the project in terms of the creation of a new figure and its relative market potential.

The third section (Chapter 4) reports the main paths related to the ENACT program, system and resources valorization, also by building and enlarged – national and European – learning outcomes and competences matrix related to the diverse professional profiles and needs within the "energy auditing and efficiency" training and job segments.

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ENACT recommendations for all the main project results (profile, program, system and resources) have been:

- **grounded on:**
  - **desk activities**, aimed at briefly report the relevant scenarios updating and enriching the initial research evidences and focus them on some specific recommendation pillars;
  - **in field activities**, with referance to the evidences/evaluation both of the piloting and of the valorisation activities with relevant stakeholders. In fact, it includes relevant conclusions reached by stakeholders involved on the project development during the project evaluation, which could prove to be valuable recommendations for the improvement of the ENACT training program, system and resources.
- **related to actions:**
  - **realised** within the project timeline and
  - **planned** to be further implemented at each national and European level, also in terms of **recommendations**.

Both dimensions are reported in each section and then recalled, with reference to the recommendations, within the conclusions aimed at clustering all the main challenges for the energy auditor profile, job market and education and training potentials within **a short list of most relevant ENACT Recommendations.**

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2. THE FUTURE OF ENERGY AUDITING: SCENARIO ANALYSIS

This section deals with the main scenarios, both at each national and European level, relevant to the professional development of the energy auditor; Energy auditor professional profile(s) definition, as well as job market opportunities depending on the sectorial and institutional dynamics, including the policy dimensions and the incentive system promoting the ENACT profile job demand. Coupled with this last "demand" dimension, also the "supply" level has been investigated in terms of alignment of qualification frameworks and educational and training systems.

These scenario allow to define:

- some of the most relevant policy recommendation addressing the need of fostering energy auditor job market opportunities in terms of impact on the overall employment and environment systems. At the same time, the need of contemporarly address the "supply" (of job and competences) with special referance to the education and training systems (and professionals "certifications" and networks). This allows to complete the triple - E challenge of aligning policies and investments in Education, Employment and Environment;
- the main frame for the identification of the main recommendations and valorisation paths for the ENACT main results (qualification schema; program and resources; technology enhanced learning system), as addressed in the following section of the document.

As already reported, scenario analysis and policy recommendations have been:

- grounded on desk and field activities, both with referance to piloting evidences/evaluation and to valorisation activities with relevant stakeholders.
- related to actions realized within the project timeline as well as recommendations to be further implemented at each national and EU level.

ENACT Energy Auditor is a professional defined to work in the area of residential buildings, providing services in form of energy audits for private investors and estate managers. The present paragraph on the scenario analysis provides an overview on aspects which affect the residential energy efficiency market and which may be determinant for the market growth and therefore increase the potential employability of ENACT energy auditors.

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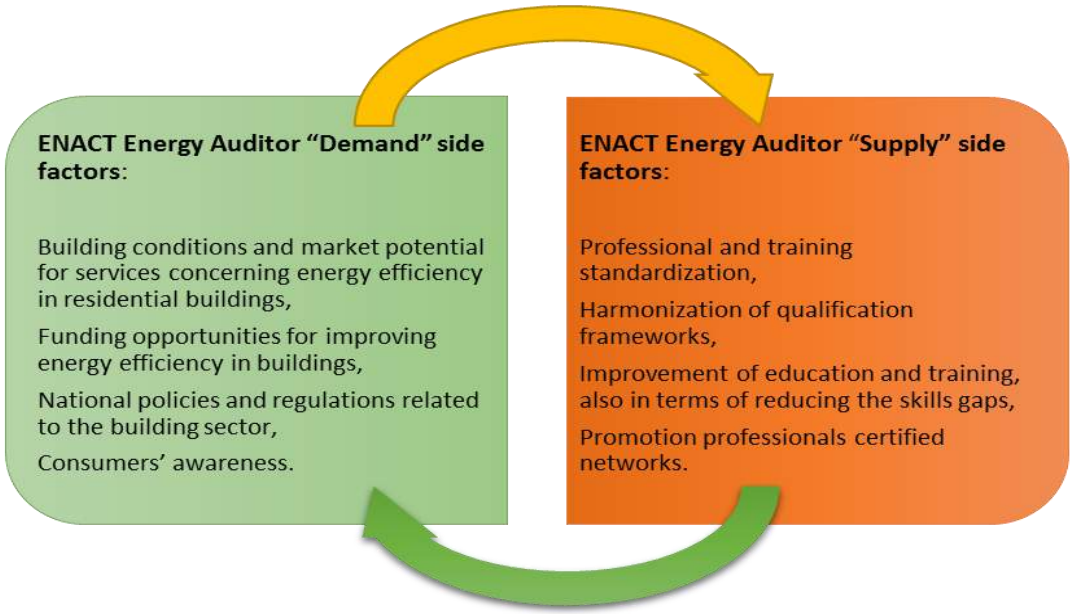
Numerous factors have been recognised within the project to have an impact (either positively or negatively) on the domestic energy efficiency market. However, whether the factors apply to large multi-store apartment buildings or single family houses, it is possible to cluster them in two main groups: demand side and supply side factors. For the purpose of this brief scenario overview, the partners - with the support of stakeholders involved - have identified and analysed the following demand and supply factors which may strongly influence the ENACT Energy Auditor job market (detailed in the following paragraphs).



2.1 THE ENACT DEMAND FACTORS

2.1.1 BUILDING CONDITIONS AND MARKET POTENTIAL FOR SERVICES CONCERNING ENERGY EFFICIENCY IN RESIDENTIAL BUILDINGS

The energy consumption of buildings constitutes 40% of the total energy consumption in Europe. Savings of energy due to renovations and thermo-modernisations in particular countries are estimated between 55% and 80%. This is a great challenge and also a great opportunity for energy auditors as their knowledge, skills and experience could highly contribute to achieve such energy savings.

The table below summarizes the number of existing buildings in partner countries, their condition, energy consumption and the share of buildings which need to be renovated.

	Italy	*Spain*	*Portugal*	*Poland*
Number of buildings in the residential sector [mln]	*12,2*	*15,3*	*3,5 (buildings) 6 (dwellings)*	*5,0*
*Average energy consumption of most common buildings [kWh/m^2*year]*	*160-240*	*NA*	*220 – 230 (*)*	*240-280*
Number of buildings which needs to be repaired/thermos-modernized	*NA*	*NA*	*29%(**)*	*50%*

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2.1.2 FUNDING OPPORTUNITIES FOR IMPROVING THE ENERGY EFFICIENCY IN BUILDINGS

Financial instrument facilitating the renovation of buildings with the aim of making them more energy efficient can be found in several countries. Although job creation may not be the primary aim of such initiatives, these programs are recognized as having positive effects on employment.

The Financial and Fiscal and regulatory measures are the most common type of measures implemented in European countries, having the biggest influence on the development of energy efficiency building sector. Below the overview on the instruments:

- **Financial incentives**:
  - Shifts in taxation[7] - fiscal instruments to encourage companies and individuals to divert their consumption or production to more environmentally friendly products and services.
  - Financial incentives - with reference to the private residential sector, linking bank loans (referred to buildings/apartment buying and/or restructuring) interest rate to the energy performance
  - Local, national and European funding access and financial support for "green innovation" projects
- **Other grant and subsidy scheme** can be found in Malta (grants for the purchase of photovoltaic equipment) and Romania (the 'Green House/Casa Verde' initiative), while in the UK an energy efficiency grant scheme has been replaced by the 'Green Deal' loan scheme which households can access to pay for work such as insulation. This shift can be quote relevant in those scenarios, such as the Italian one, where the efficiency and auditing services are mostly related to already existing buildings.
- **Institutional investments stimulating the energy auditors' services demand**. These can work in many different directions, such as positive incentives (as above described) and as mobilisation of public and public/private investments in the field of the green economy/residential (it will impact on Energy Auditor demand)
- **Institutional intervention can also operate as "negative incentives",** in terms of penalties and or compulsory standard to be compliant to.
- **European Union and national funds** are available in particular countries for investors to finance energy efficient investment.

The most popular incentives in countries which participated in the ENACT project are reported below.

Italy	Spain	Portugal	Poland
- Tax deduction mechanism - Thermal account - White certificates;	- National, regional and local grants	- Energy Efficiency Fund - Tax deduction	- White certificates systems -Subsidies: Renovation and Thermo-modernisation Fund - Programs financed from Environmental Protection Funds

[7] EEO REVIEW Promoting green jobs throughout the crisis: a handbook of best practices in Europe, European Commission, DG Employment, Social Affairs and Equal Opportunities(2013)

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Detailed information on national legislation in partners countries are described in the ENACT National Reports and Comparative Report (activity O1) which can be found at the www.enactplus.eu website.

Here are reported only the main ones in order to highlight, consistently with the document aims:

- how these opportunities frame impact on the development of the ENACT Energy Auditor development directly and indirectly;
- the obstacles/critical dimensions and, in turn, the conditions of these incentives to allow them to effectively support the energy efficiency improvement and, in turn, the Energy auditor services demand.

All partners and stakeholders agree that financing opportunities greatly influence the development of the ENACT Energy Auditor. The financial instruments could have a;

Financing opportunities greatly influence the development of the ENACT Energy Auditor development directly and indirectly

- direct impact on the ENACT Energy Auditor demand side – as energy audits should be obligatory whenever financial instruments support renovation or modernization of buildings –
- indirect impact, on the demand side of the ENACT Energy Auditor, as they may be involved in the process of obtaining the subsidies.

According to subsidies it is important that the **level of funding is sufficient** and energy audit costs could be included as eligible costs. In Italy, the "Thermal account" incentive provides for the compulsory energy audit and for some kind of interventions. The expenses for energy audit for public institutions are totally covered by the fund. For privates, the expenses are covered at least for the 50%.

Incentives effectiveness conditions

Every partner's country has funding opportunities for single-family buildings, however all of them need continuous **revisions and update of the technical requirements**. These funding opportunities aim to rise access to funds however requires from energy auditors systematic development of knowledge.

It is important that subsidies have sufficient resources and give **equal chances to all beneficent**. In Poland, the Renovation and Thermo-modernisation Fund has been active since 1998 yet the share of loans with grants for thermos-modernisation activities in single houses is smaller compared to multifamily houses, only 701 single family houses used the subsidy in the 14 years period. We believe the reason for this is the insufficient funding and the form of the incentives provided.

It is also crucial to **minimize formalities** for the individual consumers in order to reduce the time spent to possess the grant or ensure professional advisor – ENACT Energy Auditor in the process of obtaining financing.

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Further **funding programs are often unused due to a lack of information and / or a difficult application process.** Italian focus groups and stakeholders meetings evidences highlighted the relevance to:

- improve knowledge and awareness of final target/users/buildings owners;
- improve knowledge of consumers on these instruments by providing them the necessary information, i.e. it would be a good idea to spread the knowledge, for example, on tax deduction. The consumers awareness building can represent a core activity carried out by the ENACT Energy Auditor. Its effectiveness is enhanced by effective institutional general action aimed at:
  - reinforcing the consumer awareness and their propensity to the energy improvements and, in turn, on the access to the funding and the request for energy auditor services;
  - lowering the consumer resistance and improving, on the contrary, their trust by endorsing both the funding programs and the professional(s) intervention.

Both aspects call for a stronger focus on the communication competences and for certified networks/trust.

Another interesting approach to overcome this obstacle and develop energy auditor profession is a long term "energy efficient" agreement between the energy supplier and the client – home owner. The supplier contracted for the energy supply provides the funds for energy efficiency investments (i.e. replacing the windows or insulation). Polish partner (KAPE) considers that this type of financial instrument will increase energy efficient investments in households and consulting services provided by ENACT Energy auditor who, in this scenario, may work for the energy supplier.

2.1.3 NATIONAL POLICIES AND REGULATIONS RELATED TO THE BUILDING SECTOR

Each European country according to art 4 of the Energy Efficiency Directive (EED) should "establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings with a view to improving the energy performance of the building stock." In order to transpose the Directive and to increase the rates and depth of building renovation, the Member States were asked to develop their first renovation strategies and provide their third NEEAPs, due by 30th of April 2014. Unfortunately the presented plans report only the existing measures, while the future planned activities and measures, which can affect the job market are not described therein[8].

To create good job opportunities for ENACT Energy auditor, decision makers should provide a long term strategy and provide a clear roadmap on the evolution of future policies and measures in the context of energy efficiency of buildings.

The table below shows policies and regulations affecting the energy efficiency in buildings from all countries that took part in the ENACT project:

[8] http://publications.jrc.ec.europa.eu/repository/bitstream/JRC97754/syntesis%20report%20building%20renovation%20strategies_online%20fin.pdf

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Italy	Poland	Portugal	Spain
National Energy Strategy (NES) from March 2013 Action Plan for Energy Efficiency 2014	Energy Policy of Poland until 2030 from 2009 National Action Plan on energy efficiency from 2015	National Action Plans on Energy Efficiency The New Renewable Energy Strategic Plan The National Climate Change Program	National Plan for Energy Efficiency Europe 2020 Strategy

Detailed information on national legislation in partner countries is described in "ENACT Comparative Report" (activity O1) - www.enactplus.eu website. Assuming the same approach of the previous paragraph, here are reported the main ones in order to highlight, consistently with the document aims:

During the projects, several inputs have been collected from national stakeholders on the **possible changes of regulations which may positively influence the domestic energy efficiency market**. More specifically, **regulation recommendations** refer to:

Changes of regulations positively influence the domestic energy efficiency market and the Energy Auditor opportunities

- Compulsory energy audit in the residential sector and performed by certified ENACT energy auditors to improve the quality of energy audits and effectively impact the reduction of energy demand and improving environment protection. For example in Italy, energy certification is compulsory in estate market of houses and it has brought an increase in awareness on domestic energy efficient issues in householders.
- Compulsory energy audit according to specified methodology to gain access to funds. For example in Poland the energy audit definition was set up in National Act which introduced the Fund for support refurbishment and thermos-modernisation investments in buildings. The energy audit is an obligatory document to achieve bonus to refundable incentive. This represented the basis for the creation and growth in Poland of the energy auditor profession;
- Energy audits should be performed by certified ENACT energy auditors to improve the quality of energy audits and effectively impact the reduction of energy demand and improving environment protection; According to art. 8 of Directive 2012/27/EC, in Italy, since July 19th,2016, the energy audits for obliged enterprises have to be carried out in an independent manner by qualified and accredited experts (i.e. Energy management expert (according to UNI 11339 standard) and energy auditors according to EN 16247 standard).

In addition to incentives and funding "demand factors" (as in the previous paragraph) and the regulation ones promoting the ENACT EA job market and opportunities (just reported) other "policy recommendations" has been developed, addressing ENACT **supply dimension**, with reference to:

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- Clear definition of the different professional figures role in the energy sector. Indeed, even though the market is still unregulated to some extent, the definition of professional profiles is currently being implemented in all partners countries;
- Clear and unique indications on the energy audit. The norm 16247 should be implemented in national legislation to unify methodology of audit preparation. For example in Poland in national legislation exists few types of energy audit definitions which are not in compliance to 16247 norm. Also several financing measures requires different methodology of audit.

These themes will be commented also in the "supply" section.

Finally, another relevant policy recommendation relates to the need of implementing national campaigns:

- **rising consumers awareness** on the profitability of energy efficiency investment and their impact on environment through, that encourage and push consumers (owners of buildings) to invest into energy efficiency of the residential building and, in turn, enhance energy auditor professional and job market potentials;
- **building consumer trust**, particularly relevant for the ENACT Energy Auditor, also by promoting and "institutionalizing" certifying mechanisms and/or professional networks.

In all partner countries stakeholders recommended to enlarge national communication activities. Information on possible financing instrument should be communicated in a simple way and spread to a wide audience. Recommendations gathered during ENACT on possible rising awareness activities are:

Partners and stakeholders agreed that a very relevant factor impacting energy efficiency management and auditing services (and its job relative market) is ***consumers awareness and trust building***

- Widespread awareness raising actions i.e. through institutional communication or wide spread "Energy Informative desks", etc.;
- Promotion of the take-up of green technologies and renewable energy sources and enhancing private and public institutions, not only by financial incentives but also by creating awareness of and social pressure for the transition to a greener economy (EEO Review (2013),
- Enhancing private and public institutions through competitions with awards can have a very positive role both in motivating actors, creating awareness and even in technology development.

2.2 THE ENACT SUPPLY FACTORS INFLUENCING THE ENERGY EFFICIENCY SERVICES MARKET

European impacting recommendations and conclusions of the ENACT Energy Auditor "Supply" side factors influencing the energy efficiency services market are illustrated in the following chapters of this document, bearing in mind that ENACT project aimed to contribute to the:

- **professional and training standards standardization;**
- **harmonization of qualification frameworks;**
- **improvement of education and training, also in terms of reducing the skills gaps.**

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European policies on energy efficiency, in the domestic market, contribute to the growth of energy efficiency investment in Europe. The growing demand for energy auditors services in the residential sector was also highlighted by stakeholders within the project's evaluation activities. The high number of people present in the various multiplier events organised within the project and the high number of experts registered for the pilot training in Italy can also be considered as a proof of the **high need for actions regulating the energy auditor professional and job market.** Partners and stakeholders also agree that the "supply side" recommendation actions might improve on the promotion of **professionals certified networks,** that can in turn enhance two very strategic dimensions: development of crowd sourcing business areas and building of trust. As commented in the previous paragraph, trust-raising indeed is a transversal factor, impacting (and requiring simultaneously) on both sides: on the demand side in the residential sector of customers awareness raising and on the supply side of certified networks.

Going back to the supply side recommendations development, the focus on the three field just quoted (*professional and training standardization; frameworks harmonization; VET improvement and skills gaps*) need to take into account a **common frame related on the necessary consideration all the different job markets relevant for the Energy Auditor**.

The deepening of the analysis on (enlarged) professional and job market opportunities has allowed, in turn, to ground the ENACT system, program and resources recommendations and valorization (described in the next chapter) not only with reference to the specific segments of the ENACT Energy Auditor but also within an enlarged (in scope and in educational level) professional profile matrix and training system.

2.2.1 ENACT ENERGY AUDITOR ON THE JOB MARKET

The definition of the potential ENACT Energy Auditor job market has been carried out in line with the main scenario evidences and the feedbacks collected during focused in-field actions activities (such as focus group in Poland, Portugal and Spain and a questionnaire delivered to 70 professionals in Italy). The evidences arising from the in-field analysis has confirmed that the professional profile of Energy Auditor is quite differentiated and enlarged to transversal, managerial and soft skills. A very small percentage has defined the ENACT Energy Auditor profile only related to the diagnostic competences. Almost half of the respondent has highlighted that, although the core professional focus is on the audit, the ENACT Energy Aditor has specific and significant energy management competence. The 20% of respondents has integrated the managerial skills even more as featuring the ENACT Energy Auditor profile. Almost 80% of respondent confirmed the relevance of planning and communication skills. A deeper analysis of the learning outcomes articulation has been deepened within the building of a cross-professional matrix and of an integrated training matrix, described in the next Chapter 4.

The potential professional and job opportunities for the ENACT Energy Auditor has been referred mainly considering:

1) **In a narrowed view of its professional area**, as individual auditor for single family houses, which are not covered by other professions and with diverse scopes/activities/roles, such as:

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- provide a comprehensive service in all refurbishment to house owners/estate managers process (energy audit, acquiring financial incentives;
- advise and support planners in the process of the building planning or/and construction process, as an advisor the ENACT Energy Auditor should propose the best solutions of HVAC systems (Heating, Ventilating and Air Conditioning), building envelope and building maintenance to investor;
- verify the energy efficiency effect of the building. As a verifier ENACT Energy Auditor can assess the correctness of the work performed, monitor and analysis of energy consumption and advises of improvements (change the contract to supply heat and electricity, change of inhabitants habits)
- support house owners/ estate managers in acquiring financial incentives

2) In an **enlarged view of its professional area**. Possible paths of the ENACT Energy Auditor professional development on the job market are concerned with expanding the area of work and/or expanding the areas of customer types such us Enterprises (SME'S, manufacturers, services). Some examples are:

   - advisor to inhabitants (house owners). ENACT Energy Auditor can be employed in administrative units (city hall) to give advice local residents on thermo-modernisation and verify energy efficiency investments;
   - advisor and auditor for other buildings including industrial, business and public buildings, with special refer to the professional potentials in supporting (as external consultant or employee) the general service department of small enterprises:
   - Consulting and auditing within an industrial/thermal processes, as well in transport and logistics.

3) **Supporting energy manager** within medium-big enteprises and/or public administration.

In all cases, its possible forms of business activities can be related (as confirmed by a focused in field action with professionals) to: freelancer; ESCO companies employee; small companies consultant and/or employee; administrative units (city hall) employee.

The consideration of all the diverse professional and job opportunities (fostered by the demand/supply actions above described) are then deepened in the third and fourth chapters with reference, respectively, to the program and the curriculum enlargement potentials and to the training system and resources potential valorisations.

2.3 CONCLUSIONS & RECOMMENDATIONS

Positively impacting on both demand and supply side also means improving the links between environmental and employment that represent the key element to deal with the:

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- "Triple E" challenge, defining an integrated policy approach to Environment, Education and Employment;
- Main weak factors identified by the European Commission (2013b) as hindering the "Pathways to green jobs: strategies and policy options for a sustainable job-rich recovery" as in the following table.

Overview of the main messages from the ENACT Thematic Events

Key conditions	Challenges and concerns	Policy responses
Political commitment	Insufficient prioritisation of climate and environmental concerns or inconsistent manifestation of commitment across Member States.	Consensus building to establish common commitments and funding priorities for strong environmental policies.
Policy coordination and integration	Insufficient co-ordination between local, regional and national authorities and across government departments means that green issues are seen as an after-thought, at best.	Invest in capacity building and establish networks or a coalition of interests across relevant policy domains.
Innovation and finance	The required investment capital or financial incentives to stimulate technological innovations are missing.	The adoption of financial mechanisms, incentives and co-funding models to stimulate private and public investment.
Education and training	Skills gaps, training needs or a lack of recognition or transferability of skills can hinder the development of greener jobs and industries.	Strengthen links between labour market actors (education and training, employment services, trade unions and industry).
Individual and firm mentality/ behaviour	Entrepreneurs, innovators, workers, voters and consumers remain unconvinced of the benefits of greening.	The use of fiscal and information tools to raise awareness and communicate the mutual benefits between economic, environmental and social goals.

These factors have been confirmed by the in-field analysis carried out with almost 70 experts within the ENACT recommendations. Most relevant interventions propose to improve the following ENACT Energy Auditor services:

- Defining energy-reduction incentive both in the public and private sectors and foreseeing the reimbursement of expenses for energy audit;
- Realizing domestic energy efficient information campaigns addressing consumers and stakeholders;
- Promoting (also at European level) the Energy Auditor professional profile, highlighting the "right role" considering the specific skills in auditing compared to a more managerial figure as can be the Expert in Energy Management (EGE in Italy) or the Energy Manager or compared to the certifier that is a specific technician with skills for energy performance certificate;
- Promoting network or register of professional;

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- Raising awareness on environmental issues aimed at improving the overall energy performance of the buildings, with the consequent improvement of environmental quality.

To summarize the analysis, conclusions which may contribute to the future development of the energy efficiency market and the ENACT Energy Auditor are:

- ✓ Market demand for services improving energy efficiency of one-family houses should be activated.
- ✓ Financial incentives should be more focused on investments improving energy efficiency of one-family houses.
- ✓ Measures improving investors'/consumers awareness and trust should be undertaken and energy efficiency financing instruments should be advertised/popularized.
- ✓ There is growing demand among currently working auditors to improve their qualifications and their dynamic alignment on a both cross-regional/national level and on an enlarged professional family related to the energy efficiency management and auditing. This in turns, requires also the development of effective education and training systems (aligned on both perspectives).

The recommendations valorisation of the ENACT professionals has thus been related to the enhancement of its relevant (actual and future) job market potentials by the implementation of specific actions on the relevant regulatory, programmatic and policy scenarios as well as on both job demand and supply systems. These overall policy recommendations influence the valorization processes (and potential impacts) of all three ENACT main outputs/results (qualification schema; program and resources; technology enhanced learning system), as reported in the following section of the document.

POLICY RECOMMENDATION – FOSTERING DEMAND AND SUPPLY ECOSYSTEMS ENHANCING ENERGY AUDITOR JOB MARKET, CONSUMERS AWARENESS AND TRUST

1. Defining long term strategies, policies (including incentives and funding scheme) integrating employment, environment and education
2. Introducing incentives scheme supporting the take up of actions provided within a "regular" energy audit
3. Focusing on awareness-raising activities at national/regional level concerning the existing funding opportunities available for consumers, in order to achieve national/regional policy goals, stimulate market demand and increase labour market relevance
4. Building trust through transparencies and promoting/validating certified professionals networks and certified Energy Auditing VET centres
5. Inserting in the legislation compulsory auditing for the residential sector
6. Inserting in legislation compulsory training for acquiring and/or renewing the certification (also in terms of not formal training by enhancing companies availability of training on the job)
7. Harmonising the national legislations to the unified methodology of energy audit with wide spectrum of European standards

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3. RECOMMENDATIONS FOR EFFECTIVE IMPLEMENTATION OF THE ENACT ENERGY AUDITOR QUALIFICATION SYSTEM

This section deals with the definition of the main paths to be undertaken to effective implement and **valorize a common energy auditor qualification scheme (and related professional systems), in terms of both dynamic integration within regional/national qualification frame and within European professional standards** as possible follow-up of the project in terms of the creation of a new figure and its relative market potential.

After analysing the main actors and qualification governance model as well as the state of the art at each national level related to the Energy auditor qualification frame(s), the main valorisation activities related to the ENACT qualification scheme are:

- Its cross national transfer, by sharing the profile with other European countries. This will sustain not only the development of common European job market segments but also the potential valorisation of ENACT training and systems (enhanced by the sharing of the qualification scheme);
- its integration within the partners regional and national qualification frames, taking into account, although in a common EQF frame, the different repertories architectures;
- its integration within the European (and national) standards related to the Energy Auditor, such as the UNI CEI EN 16247 (with special reference to the Chapter 5);
- its progressive enlargement to other actual and emerging professional profile: within the same scope (enlarging: to the overall private building auditing and or the industrial ones) and/or complementary ones (energy management and so on). These aspects have been developed within the next sections.

Follow-up and valorisation activities have been carried out within project timeline with reference to all the four directions. Further actions and recommendations have been defined and shared among partners.

3.1 QUALIFICATION GOVERNANCE MODEL

On the basis of the results of the ENACT comparative analysis conducted in the first stage of the project and also of all the communication and evaluation activities carried out during the project development national and regional **stakeholders** from the **employment, environment and education sectors have been (and will be further) involved** in the implementation of the ENACT Energy Auditor qualification scheme, as reported in the following diagram:

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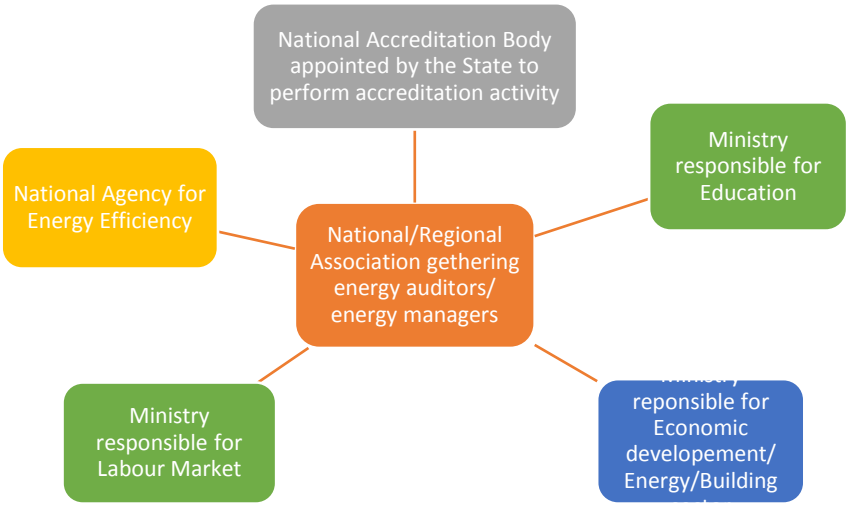
Stakeholders engaged in the ENACT qualification scheme



Working group for the definition of the qualification scheme and for future valorization activities should be created to unify actions and criteria. The leader of the group should be a representative of energy auditors, an association or federation, who has the highest interest in creating good working conditions and development opportunities for this professional group. Other stakeholders which could be included in the group and/or should be engaged during communication are:

- **Appropriate Committee for Standardization**
- **Body responsible for EQF implementation.**
- **Universities or professional training centres.**
- **Financial Entities.**

The involvement of the main stakeholders into the valorisation process will enable optimization of the ENACT Qualification Scheme and also supervise the introduction of the scheme in the National / regional frames. The table below shows the names of national entities in the four project countries which have been or will be involved in the process.

ENACT stakeholders

	ITALY	POLAND	PORTUGAL	SPAIN
National/Regional Association gathering energy auditors/ energy managers	Italian Federation for energy efficiency (FIRE); Energy management experts association Assoege	ZAE – Association of Energy Auditors	OE - Professional Association of Portuguese Engineers RNAE - National Energy and Environment Agencies' Network	APADGE - Andalusian Professional Association of Energy Managers
Energy Agencies	ENEA (Italian National	KAPE (The Polish	ADENE (Portuguese	Andalusian Energy

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	Agency for New Technologies, Energy and Sustainable Economic Development), RENAEL - Network of local energy agencies, Italy	National Energy Conservation Agency)	Energy Agency)	Agency (Regional) EnerAgen (Spanish National Association of Energy Management Agencies)
National Accreditation Body	Accredia - Italian National Accreditation Body	Polish Centre for Accreditation	ANQEP - National Agency for Qualification and Vocational, Education and Training	INCUAL – Spanish National Institute for qualifications
Education/ training entities	AISFOR - Training company MESOS - Training company	Universities (ex. Warsaw University of Technology)	Universities (e.g., Instituto Superior Técnico)	INCOMA - Training company, Spain Universities (ex. Faculty of Building Engineering of the University of Seville)
Committee for Standardization	CTI (Italian Thermotechnical Committee)		IPQ – Institute Portuguese for Quality	AENOR (Spanish Association for Standardisation and Certification)

3.2 EUROPEAN AND NATIONAL INTEGRATION OF THE ENACT QUALIFICATION SCHEME

In all the partner countries, in which the National Qualification Framework is under development, there is short overview of the integration of the ENACT Energy Auditor scheme in two main directions:

1) integration within national and regional qualification frames;
2) integration within the European standard UNI CEI EN 16247.

Qualification scheme common directions:
- *integration within NQF/EQF*
- *integration within UNI CEI EN 16247*
- *scope enlargement ("civil" not only residential)*

The paragraph also introduces the potential of enlarging ENACT, in terms of professional profile and qualification scheme, to other application fields (overall private buildings).

2.3.1 *INTEGRATION AT NATIONAL LEVEL*

ITALY

In Italy, the **National Qualification Framework** for lifelong learning composed of 8 levels (in line with the EQF) is already in force and defined within the **regional** and the national system (depending on the EQF level). Regions have been cooperating in the last years to define a common and "interoperable" qualification schema that is about to be published.

The contemporary consideration of:

- the need to define an organic professional and qualification frame for the energy-related profile (both at European and national level)

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	- the quite fragmented situation among regional repertories and the difficulties in integrating new profiles within traditional repertories (and with homogeneous results among regions) - the employment of a KSC- and learning outcomes- driven approach in building the ENACT frame (starting from the in-depth analysis of all the Italian regional repertories) have suggested to employ a valorization approach at national level based on two main streams: ▸ the involvement of relevant **stakeholders**, with special reference to some **regions** (participating to ENACT national events and through the RENAEL institutional network on many regions); ▸ the definition of common strategies and actions with other projects and stakeholders in order to multiply and strength the ENACT integration potential. ENACT has been **interacting with many other national and European project** (Builds up, ITown, …) and has signed a focused partnership agreement with the BRICKS project. As already reported, these collaborations aimed to valorize the synergies of common actions with the regional and institutional actors in two main directions: ○ policy actors awareness raising and policy recommendations fostering interventions, recommended both on the demand and supply side; ○ qualification actors involvement within a proposal of an integrated system of professional profiles addressed in the different projects. As regarding the integration of ENACT within the UNI CEI EN 16247 norm, AISFOR and RENAEL have participated to the **technical committee meetings** defining Chapter 5 of the norm. In **all three directions (NQF region, European standards**) the valorization activities will be further deployed also after the project ending, aimed at fostering ENACT profile valorization and dynamic alignment.
POLAND	In Poland, the National Qualification Framework for lifelong learning composed of 8 levels (in line with the EQF) is already in force but is still under implementation. The Integrated System of Qualification has been introduced in the beginning of 2016 by national Act. In July of 2016 the system was officially launched with a internet site. The three highest levels are linked to the qualifications framework for higher education. These levels are equivalent to levels 6 to 8 of the EQF and respectively refer to university degrees (engineer, master of since, doctorate). The entry level in Poland is the same as for people qualified to prepare energy performance certificates, so all with engineer (1st level of higher education) and master of science or architects (2nd level of higher education), which is equivalent to the 6 or 7 level of EQF. During the validation process, supported by different focused meeting with KAPE internal and external stakeholders, it was considered that the acquisition of the qualifications addressed in the ENACT Energy Auditor in Poland could also be acquired through VET course with the validation of professional experience in certain specialties. The formal activities regarding national legislation need to be undertaken to integrate the ENACT Qualification Scheme to the Polish Integrated System of Qualification: ▸ **Inclusion of the ENACT Energy Auditor qualification.** ▸ **Establishment of entity for external quality assurance.** ▸ **Establishment of a certifying authority**
PORTUGAL	In Portugal the proposed scheme will correspond to the three highest levels of the National Qualification Framework: bachelor's degree, master's degree and PhD. At the initial stage, the entry level will be restrictive, as it will require that only experts on energy certification of buildings should access this qualification; thus, they should detain degrees on engineering or architecture recognized by the respective professional association.

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In this frame the forecasted content of the training course will focus in the following themes:

- Energy consumption in the residential sector and general methodology for audits.
- Measurements techniques
- Energy characterization of facilities
- Analysis of energy bills
- Measures for energy improvement
- Energy audit simulation
- Preparation and elaboration of energy audit report

Taking into account the national situation and the analysis and comments from stakeholders, the ENACT Energy Auditor qualification scheme can contribute to expanding the competences of an existing profession – the qualified expert on energy certification of buildings.

As stated above, the program in Portugal, as well as its entry level requirements, will be fairly different from that defined in the ENACT framework. Nevertheless, depending on the evolution of European and national policies and legislation, it is foreseen to adapt in order to extend to other activity sectors. Furthermore, such adaptation will facilitate integration into the national qualification framework, and in the long term, to share the results with other EU countries. In order to achieve this results, many focused meetings with ADENE internal and external stakeholders has already been organized during the project timeline. Additional activities will be undertaken both at the EU and national levels.

SPAIN

Spain is currently developing a National Qualification Framework for lifelong learning based on learning outcomes (MECU). It will link and coordinate different education and training subsystems and will be composed of 8 levels (in line with the EQF).

The four highest levels are linked to the qualifications framework for higher education (MECES), which was put in place separately and is already being enforced. These levels are equivalent to levels 5 to 8 of the EQF and respectively refer to higher VET technical education diplomas and university degrees (first cycle, second cycle and third cycle).

There are 3 main ENACT entry levels defined for Spain:

- **Technical university degree (equivalent of NQF level 6);**
- **VET technical education diploma (equivalent of NQF 5);**
- **VET training with a duration of 2 years (expected to be equivalent of NQF and EQF level 4) – plus at least 2 years of experience.**

In the cases where participants do not possess formal qualifications, they should have at least 3 years of relevant professional experience.

The ENACT entry level requirements for Spain, especially the possibility of providing access to experienced professionals without formal training, are in line with the provisions defined in the Royal Decree nº 56/2016, according to the evidence collected during the project evaluation activities.

Certification and accreditation of the ENACT Energy Auditor in Spain would be based on an evaluation and verification of professional experience, validating its quality.

The acquisition of the qualifications addressed in the ENACT Energy Auditor in Spain could be acquired according to 3 different pathway: University degree, VET course and through the validation of professional experience in certain specialties, which is in line with the legislative background mentioned previously, and also with the entry level defined for Spain.

Market trends highlight that in the future 3 different profiles will coexist, according to their degree of specialization: an advanced profile including professionals with a University degree (equivalent of

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EQF6), an intermediate profile for professionals with a Higher Technical VET diploma (equivalent of EQF5), and an assistant figure (entry level) for professionals with a 2-year VET degree (equivalent of EQF4).

Despite the particular situation in Portugal, the harmonization of the energy auditor profile and the competences will be a fundamental milestone for regulating this professional qualification both at the European and national levels. Moreover, the creation of the energy auditor professional profile for the residential sector will contribute, for many partners, to the expansion of the competences of an existing profession – expert qualified for the energy certification of buildings. In Italy the ENACT Energy Auditor will prepare energy audits for private single house that are not covered by other professionals

Furthermore, the scope of activities (profile) of the ENACT Energy Auditor should not be restricted only to residential buildings, but any consumer installation of energy. This requires and enlargement of the ENACT training program and learning resources, as described in the next sections.

The table above reported also shows the actors and activity undertaken (and to be undertaken) at each national level to valorize ENACT integration within regional, national and European professional standards, on the basis of the relative qualification schemes (deepening also the contents of ENACT Comparative Research, available on the project website) and on stakeholder analysis reported in the first paragraph of this section.

2.3.2 INTEGRATION WITH EUROPEAN STANDARDS SCHEMES

The ENACT Energy Auditor profile for the residential sector is based on the European norm UNI CEI EN 16247 (Energy Audits), especially on its 5th chapter "Energy Auditors Competences" that specifies the competences of energy auditors to effectively implement energy audit. The final chapter of the European norm UNI CEI EN 16247 was adopted in the partners countries in 2015, but its application varies from country to country. The methodology to carry out an energy audit by the ENACT Energy Auditor is compliant with the norm (UNI CEI EN 16247).

Partners and stakeholders of project recognized that for the UNI CEI EN 16247 norm:

- the main strength of is that it has defined a common methodological and competences frame.
- one relevant weakness is that it lacks a more specific operative common scheme.

Taking into consideration the fact that the UNI CEI EN 16247 norm is very recent and is still in the process of implementation, the ENACT professional figure and relative training programme may help raise awareness on the profile of the energy auditor in the domestic sector, thus contributing to the implementation of the norm despite its focus on a different sector (ENACT focuses on the domestic sector while the norm includes all civil sector, industrial and transport sector).

In Spain this norm is applied only to energy audits in companies, as defined by Royal Decree nº 56/2016.

In Poland, the definition and scope of an energy audit included in the existing national regulations is not in line with definitions of energy audit of norm UNI CEI EN 16247. In Poland the profile of an energy auditor prepares the energy audits (two types), following several very detailed regulations (Energy efficiency Law, Act on Support for Thermal Refurbishment and Renovations and related regulations). The process of the

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norm implementation would be considered within amendments to Energy Efficiency law which is planned in the end of next year.

In Portugal, the frame of the European norm UNI CEI EN 16247 is the Energy Management in a comprehensive approach, and ENACT focus on the residential sector and a possible integration will be a long term process and, most probably, it will include all activity sectors. On the other hand, it should be mentioned that the stakeholders contacted considered that the profile of an energy auditor should follow the guidelines of ISO 50002 (as it is a reference for measurement and calculation of data).

In Italy on the basis of the project results and a detailed analysis of norm UNI CEI EN 16247, it appears that the chapters 16247-1:2012 and 2:2014 may cover also individual dwellings and single family houses (despite the two standards exclude them explicitly), because there are no elements that can create obstacles for their application. The way to carry out an energy audit by the ENACT energy auditor is also compliant with the standard ISO 50002. Additionally, in Italy the scheme defined for the ENACT energy auditor profile was prepared taking into account the qualification and certification process at the national level for the energy management expert (UNI 13339). Moreover, the participation of AISFOR and RENAEL in the roundtables for the definition of the qualification and certification scheme for the Energy Auditor (as provided by Legislative decree 102/2014), has provided important and positive input to fulfill this task. The added value of ENACT should be to follow the implementation of energy efficient measures and their monitoring and management over the time. ENACT Energy Auditor should be one of the main professionals working in the residential sector especially in single family houses.

3.3 EUROPEAN AND NATIONAL BENEFITS AND IMPACTS OF A COMMON QUALIFICATION SCHEME

Introduction of the ENACT Energy Auditor profession would have major benefits on the job market and on clarifying the current situation. Firstly it would contribute to fulfilling some of the goals of Europe 2020 Strategy program: Reduction of greenhouse gas emissions by 20%; increase the usage of renewable energy by 20% of the total consumption; increase energy efficiency by 20% (compared to 1990 levels).

The standardisation of energy auditor competences will contribute to ensure the transparency and recognition of the occupation, while at the same time striving to regulate the sector as project analysis suggest. On the other hand a common qualification scheme compliant with the ECVET methodology will facilitate **labour mobility (thus promoting employability) and allow the comparability of qualified actions.**

Therefore the main benefits of introducing the Common Qualification Scheme of the ENACT Energy Auditor for residential buildings would be:

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- Fulfilling goal of article 16 of **directive 2012/27/UE** which states a need for the accreditation of energy auditors;
- Foster **professional and learning mobility** by enabling the work of the ENACT Energy Auditor in all countries of European Union;
- Increasing **employability in the green sector** through the introduction of a new profession;
- **Improving the quality of education and real outcomes-based learning**;
- Integration and development **of open educational resources** and definition of **training resources** (and measures);
- **Increase training (quantitative and qualitative) on energy efficiency** issues – new, well defined and structured courses to train the new figure of energy auditor according to the national/ regional standards. This in turn impact on significant improvements of **environmental and energy efficiency goals** (such us the CO2 reductions).

3.4 CONCLUSIONS & RECOMMENDATIONS

The **common general approach elements recommended** for a successful valorization/integration of the ENACT qualification frame (at national and European level; within and across professional scopes) are reported in the following table.

Comprehensive approach ⇨	The integration process of the ENACT Qualification Scheme is complex and cross-sector. It is important to provoke cooperation of three sectors: energy, employment, and environment. Representatives of these actors must act in a coordinated and meaningful way to ensure successful implementation of the ENACT qualification scheme. For example, financial incentives alone will not necessarily lead to successful market development, the cooperation and comprehensive approach of all actors is needed.
Long term commitment - ⇨	The need for continued action over extended periods of time and responsiveness to changes in the labour market is needed. This aspect also calls for the definition and management of effective multi-actorial qualification governance models.
Regional approach ⇨	Local energy agencies could be an essential resource for regional development of renewable energy projects and even in program management at the regional level. This aspect also calls for a multi-actorial governance models integrating education, employment and environment representatives
Learning outcome driven approach ⇨	Modular learning outcomes driven approach in defining the professional and training standards (and related professional profile) in order to support the "comprehensive approach" that means, in turn, the possibility to support: - a smoother, systematic and dynamic alignment among different: regional/national systems; professional profiles belonging to the energy auditing (and their modification over time); professional profiles belonging to other connected professional profiles; - personalized learning and professional development processes, also supported by the recognition of previous knowledge and experience of professionals, regardless of their educational qualification

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The combination of the four recommendations can effectively deal with the **Triple-E challenge** – aligning Education, Employment and Environment programs, actions, resources – that represent the cornerstone of the ENACT project and the main strategic programmatic element defined at the European level scenario.

One example of such integrated approach is represented, although narrow in scope respect to the ENACT scenario and goals, by the Polish regional administration of Małopolska Voivodship that has set up a project for implementation of new professions for the need of their region. The studies for energy advisor for residential sector, aimed at reducing low emissions, will be launched this year. Establishing high quality services does not only imply the acquirement of certain fixed skills but also to keep learning, as these technologies are still young and will be further improved as more and more experience is gained.

On the basis of market actor's dialogue, through the validation, valorization, multiplying events activities with National stakeholders including partners in other European projects and institutional bodies, further to the detailed analysis of the European standard definition (in progress) and the existing professional scheme, confirm the three main professional/job market potential for the ENACT Energy Auditor:

- within the ENACT scope with referance to the specific specialization of the professional profile in line with European standards and norms;
- within the auditing area but enlarging the scope of the intervention (from private buildings to civil and to industry fields);
- its potential integration with the nationals qualification scheme related to the energy manger profile(s);

These considerations have stimulated, the deepening of ENACT recommendations and valorizations paths with reference to the overall program, learning resources and system, as in the following two sections.

QUALIFICATION RECOMMENDATIONS

PROMOTING A COMMON ENACT ENERGY AUDITOR QUALIFICATION SCHEME AND SYSTEM BASED ON MULTIACTORIAL LONG TERM COMMITMENT AND REGIONAL, COMPREHENSIVE AND LEARNING OUTCOME

- Valorize a common energy auditor qualification scheme (and related professional systems), in terms of both dynamic integration within regional/national qualification frame and within European professional standards
- Promote articulated cooperation among the different national and regional actors that allows the unification of actions, criteria and resources for an integrated qualification framework of energy auditors and other market-relevant professional figures, and that contributes to overcome barriers in the development of market
- Assume a methodological and conceptual approach in supporting qualification scheme integration and alignment over time based on some core dimensions: *comprehensive approach; long term commitment; regional approach; learning outcome driven approach (supporting profile alignment, personalized processes and not formal learnig).*

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4. RECOMMENDATIONS FOR EFFECTIVE IMPLEMENTATION OF ENACT TRAINING PROGRAM, SYSTEM AND RESOURCES

In this section are reported the main paths related to the **ENACT program, system and resources valorization**. According to the main pilot validation feedbacks and evaluation, as well as the evidences from the in-field actions carried out to support the recommendations activities, overall ENACT valorisations has assumed a twofold aim:

- improvement and valorization of the program, system and resources with reference to the specific professional profile of the private residential energy auditor. In this area recommendations are aimed to define ENACT effectiveness conditions, improvements to be implemented (on methodologies, contents, resources) and actions to be undertaken;
- enlargement and valorization of the program, system and resources with reference to other professional profiles, such as:
  - potential professional and job (actual and emerging) opportunities for the ENACT Energy Auditor;
  - similar, complementary or partially overlapping profiles, still belonging to the energy efficiency area but different from the ENACT profile in scope and/or sector.

This has been grounded on the combined consideration of the conclusions of the dialogue with numerous market actors, the learning outcomes - driven training design and the features of ENACT program and resources (modular, open, based on the KSC for each learning outcome and unit and so on).

With reference to the first point, in order to valorize and integrate ENACT program, system and resources within each national training and professional system, a set of recommended implementations and improvements are suggested as well as effectiveness conditions related to both targets/users and qualification systems are highlighted. This is useful also in terms of planning further cross-sectorial and/or geographical transfer of ENACT overall results, experience and resources.

With reference to the second point, in order to build further training courses based on the ENACT program and resources and satisfy the educational and job markets need of an enlarged number of energy efficiency-related professional profiles, ENACT partners has elaborated three competence matrix, assuming both national and European perspective.

As described also for the qualification scheme and profile, ENACT recommendations and valorisation actions for all the main project results program, system and resources) have been:

- grounded on both desk and in-field activities, with reference to both piloting evaluation and follow-up and focused communication and valorisation activities, providing precious information to define the recommendations for the improvement of the ENACT training program, system and resources;
- partially realised within the project timeline and partially planned (as recommendations) to be further implemented at each national and European level.

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4.1. ENACT LEARNING SYSTEM AND RESOURCES FOR THE ENERGY AUDITOR

4.1.1 ENACT program and system

ENACT program covers all the learning outcomes defined in the energy auditor and is composed of **10 modules, articulated in 35 learning units** (and relative knowledge, skills and competences mix). For each module a certain number of **ECVET credits** have been assigned, out of a total of 6 for the entire 80-hour training course. This allocation was based on weighing a set of criteria, namely: number of the module hours, importance of the topic addressed and the level of difficulty (also taking into consideration the methodologies used for its fruition). Additionally, an **assessment framework** for the ENACT training program was defined, specifying entry level criteria according to each partner country's national/regional requirements, the qualification scheme, the requirements to successfully complete each module and also the final exam. Per each unit, **learning and supporting resources** have been: developed starting from the partners and from other open resources, transferred and enriched according to the relevant national scenarios (and language solution); integrated within the **ENACT technology enhanced learning system.** ENACT system is **open for the learners profile**; it can be accessed at http://enactais4fad.talentlms.com using "enact-it" as username and password.

A complete descriptions of ENACT program, system and resources and ECVET frames can be found at the project website www.enactplus.eu.

An extensive validation action has been carried out in order to validate the ENACT profile (further to previous activities carried on in the previous steps of the project), training programme and system. In Italy, a wide piloting action was carried out with 144 professionals of different Italian regions and included the delivery of the full ENACT training program. In the other countries, in order to collect relevant qualitative and quantitative evidences, more than 120 stakeholders were involved in the validation activities.

For a deeper analysis of the ENACT validation, please refer to the ENACT FINAL Validation Report and to the ENACT Italian Piloting Report (a standalone report due to the relevance and extent of the Italian ENACT piloting) available in the project website.

In the present chapter the most important evaluation evidences are reported, on which the fine-tuning activities and plan (described in those reports) as well as the valorization ones have been built.

4.1.2 ENACT EVALUATION OVERVIEW

The pilot results strongly confirmed that the **ENACT profile** is **positively assessed** by stakeholders and adequate to its purposes and that it is an **important figure for the homogenisation and regulation of the market in an unregulated sector.**

ENACT training, employability and employment relevance has been confirmed by the high number of participants engaged (144 instead of 45 in Italy; 123 instead of 45 in the other countries) and stakeholders involved, and their composition. Additionally, both in Spain and Italy, many auditors and stakeholders have already requested to access the ENACT system and its learning program and resources, not only to base the acquiring of a new qualifications, but for extending knowledge.

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Very positive learning achievements and relevant perceived professional potentials was gained by attending the course (a deeper analysis is reported in the ENACT Italian Piloting Report). A positive evaluation of the ENACT program has been confirmed by stakeholders involved in the not-Italian piloting; they mainly highlighted as very interesting and distinctive aspects its **modular structure**, the inclusion of **technical and transversal aspects**, such as marketing and communication strategies, its features/opportunities in accessing by **distance learning systems.**

The overall evaluation evidences has allowed to implement selected fine tuning activities as well as to ground the main **recommendations to further improve and valorize ENACT system, program and learning and supporting resources.**

The recommendations have been developed by clustering the main ENACT results.

Concerning the training program, it has been largely considered to be well structured and balanced in training hours and contents (width and depth).

Main recommended fine tuning and improvement actions to be undertaken to support its further utilisations and/or transferability are referred to:

- The **system and distance learning methodologies**. The distance learning solutions have been largely appreciated as effective, especially in supporting these typology of specialists, the energy auditors, learning and professional development processes. The ENACT system was considered a user friendly tool by the majority of the attendees with the possibility to have online training course 24h per day and 7 days/week, even if it reduces the interaction among the students and the teachers in comparison with face to face training courses. Evidences recommend three main improvements (to be implemented according to the specific context, scope and participant profile):
  - definition of a **blended solution**, integrating ENACT system fruition with traditional in presence activities, with special reference to some core modules, related to the "methodological" and "experiential" learning outcomes (audit methodologies, communication, funding);
  - access tool usability, with special reference to the ***multi-language and the mobile learning dimensions***;
  - participants interaction (among them and with trainers) and collaborative learning solutions;
- The improvement of **experiential learning methodologies (both in distance and in-presence)** with special reference to the same modules reported above. Activities during the project highlighted the existence of real case scenarios and the adoption of the "learning by doing" approach. This was considered to be important, positive and an advantage for ENACT, as opposed to merely theoretical training courses. The most interesting parts concern the application of the contents to real case studies, including technical and economic feasibility, and assessment. In spite of this, the majority would like to have additional case studies to analyse and would like to practice on site. Furthermore, the users considered that the (more) technical modules should have more training hours.

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- The availability of **learning and supporting materials enrichment and/or contents deepening** with reference to both "technical" and transversal learning outcomes. These enlargements are recommended to support ENACT valorisation taking into account different implementation contexts (in terms of educational level and/or geographical context) and/or participant profiles;
- **duration "balanced" review**, to be undertaken consistently with the changes/improvements realised on the methodological and contents dimensions. The joint consideration of these three aspects might also lead to and **ECVET credits review** per the learning units modified.

ENACT employment and employability potential impact has been confirmed by the in-depth **evaluation** realized within the Italian piloting as well as by the **follow-up, evaluation and valorization activities has been carried out** aimed at:

- **enlarging the potential impacts at each national level**, by sharing results and resources and identifying common interests in employing, enriching and sustaining ENACT system and resources. Event participation and meetings organization have been realized with: internal training departments in the national energy agencies (ADENE and KAPE); the professional and university target (APADGE and INCOMA); RENAEL national network of energy agencies and other VET and research centres (AISFOR and RENAEL);
- **grounding the development of ENACT system and resources further valorization** in many directions. For example, at the Italian level, starting from the above mentioned activities, partners have defined and shared the interest in jointly designing and promoting ENACT- related research and training further initiatives with national research and VET centers working into the same ENACT scope and carrying on complementary projects, such us, among others, ENEA, MESOS, FIRE. Relevant projects are **BRICKs, I Town (Italian National Build-Up project), Qualicert;** AISFOR and RENAEL have already realised many meetings and communication activities with these project to define the valorization strategies and actions to be jointly defined and realized to multiply and valorizing the national and EU impacts.

At both level has emerged the need of grounding project impact and sustainability to:

- the overall ENACT valorization and recommendations, within and integrated approach to the demand/supply scenarios, qualification frameworks and standards, actual and emerging professional and job market opportunities;
- an enlarged system of training and professional needs and profile, in order to fully valorize the learning-outcome driven approach, the richness of ENACT learning resources, the flexibility of the technology enhanced learning, the potentials of the ECVET frame, particularly relevant for these professional areas, featured by very diverse and experience-based professional development paths.

Its modular and **learning outcome-based architecture** as well as the **modular ECVET-based assessment** further improve its relevance and potential impact because it allows to effectively deal with:

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- **different entry levels based on beneficiaries' previous knowledge and expertise** allow a wider and effective path to the adaptation of the ENACT training programme according to the participant profile thus making the training more attractive and personalised;
- the present diversity within **different national/regional qualification frames** and labour market demand; and, thus, to integrate the ENACT fruition with other education and training paths.

Targets and stakeholders from all countries (involved in the piloting and/or in the follow-up actions) agree that **the ENACT profile should focus not only on the residential sector** but also addresses other sectors, such as the industry. Again, this would increase the possibilities of professionals and provide an answer to the labour market demand. Furthermore, in Spain there is also a **current existing labour market demand for other professional figures** related to the energy efficiency sector (namely, the energy manager), which could be a potential valorisation for the Consortium.

4.2. ENLARGING ENACT SYSTEM AND RESOURCES FOR THE ENERGY PROFESSIONS

The existing demand for different professional profiles within the energy sector constitutes a relevant potential valorisation for ENACT.

ENACT can be valorised by **adapting the ENACT profile and training programme** to be suitable to other relevant professional profiles from the energy sector, considering that some of the knowledge, skills and competences of the various profiles are common. This is allowed by that comprehensive and learning outcome driven approach recommended in the previous section.

At the same time, the proposed potential **enlargement of the ENACT profile** (and, thus, curriculum and training standards) in scope and/or applicative sectors (such us the industry one) would also constitute a potential valorisation of the ENACT project by capitalising on the profile and training defined and on the synergies generated during the project lifecycle.

In order to build further training courses based on the ENACT course and satisfy the educational and job markets, ENACT Partners elaborated **three competences/profiles matrix.**

4.1.3 Enlarged matrix with professionals in the area of energy efficiency services sector

The first matrix has been defined for the purpose to deepen the ENACT potentials in integrating, adapting and enriching its results and resources within an **"Enlarged professionals in the area of energy efficiency services sector"** (Annex 1).

The matrix shows the main differences among learning outcomes (in terms of knowledge, skills and competences) among the ENACT Energy Auditor and other professions in the partner countries (also related to the ones reported in the previous section with refer to the profile and program valorization).

The Italian partner mentioned five professions: Energy auditor, Energy Management Expert, Energy Manager, Energy certifier, Boiler Inspector. The first 3 profiles are similar to the ENACT Energy Auditor in terms of tasks even if in different sectors and with different level of deepening. The Energy Certifier covers

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all the energy aspects connected to the building and can issue the Energy Performance Certificate, but he lacks of management and communication skills. The boiler inspector main task is to check the heating system and also to provide a consultancy on possible cost-effective projects to improve the system's performance. He focuses his attention on the heating system and lacks of management, communication and skills.

In Spain there are two professional figures in the area of energy efficiency services sector: the Energy Manager and the Certifier. Both profiles are similar to the ENACT Energy Auditor, however the Certifier lacks knowledge in terms of regulations; financing, economic assessment and subsidies; project management; communication; presentation of results/reporting; and also in terms of knowledge of equipment and energy consumption parameters.

In Portugal, regarding the professionals in the area of energy audits, it had been identified the expert on energy certification of buildings and the energy manager. Both professional profiles have common skills and competences with ENACT Energy Auditor, namely the first one which besides the issue of the energy performance certificates, previously, is responsible to carry out an energy audit to the building.

Relevant profiles for the Polish scenarios are the following professions: Energy Auditor, Energy Efficiency Auditor, RES Installer and Building Certifier. All of the profiles are very similar to the ENACT Energy Auditor, usually they lack of management and communication skills, knowledge, competences. Big differences and "gaps skills" can be noticed in RES Installer who has good basic skills and fundamental knowledge and works for residential houses.

The matrix has correlated the ENACT system by describing it terms of learning outcomes and training units (which aim and scope is fully described to allow a robust comparison among diverse profile) and indicating per each other professional profile the potential common units/outcomes.

Although there aren't complete profile overlapping (due to the professional profiles -and qualification- diversity), a very relevant number of ENACT learning units and outcomes (and, consequently, learning and supporting resources) are related to different profiles. This allow to ground an enlarged ECVET based training system, allowing:

- integrated but personalized, learning processes recognized (and/or recognizable) among diverse partners also in different EU countries;
- a multiplied ENACT system and resources impact within many different geografical and professional (although belonging to the same professional family) areas.
  Its integration will require, of course, the adaptation to the specific context (with reference to the national regulatory and funding modules) and/or to the specific target at each national level.

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Enlarged professionals in the area of energy efficiency services sector

			Portugal		Italy					Spain		Poland			
	Enlarged professionals in the area of energy efficiency services sector	ENACT Energy Auditor	G.E	Certifier	Energy Auditor (D. Law 102/14)	Energy Management Expert	Energy Manager	Energy certifier	Boiler Inspector	G.E	Certifier	Energy Auditor	Energy Efficiency Auditor	RES Installer	Building Certifier
1.Introduction to energy auditing in residential sector	Energy units, energy sources, unit conversion factors The Unit aims to provide basic information concerning the energy sources and the energy unit conversion factors. Energy conversion is a main aspect of energy management. The energy auditor constantly uses these concepts. Therefore it is essential that the energy auditor is familiar with them.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Principles of building physic and thermodynamic The Unit aims to provide fundamental concepts of thermodynamic and physics of the building that are crucial for the following more specialized modules. The energy auditor constantly uses these concepts in order to understand energy processes.	X	X	X	X	X	X	X	X	X	X	X	X		X
	Energy auditing process The Unit aims to provide the general information to conduct an energy audit and guidance on how to carry out energy audits in accordance to the European standard 16247 or similar standards.	X	X	X	X	X	X			X	X	X	X		X

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	Tasks and functions of a residential energy auditor The Unit aims to provide the requirements, tasks and activities of auditor in residential sector. It specifies the necessary competencies in order to effectively implement the requirements of EN 16247/1, which may be supplemented by the specific part EN 16247/2.	X	X	X	X	X	X			X	X	X	X		X
	General features of the energy market The Unit aims to provide information on the energy market and actors involved. In particular, the energy auditor constantly uses concepts and solutions involving energy market from the production to the distribution, transmission, and supply of energy sectors. Therefore it is essential that the energy audits were updated based on the main feature of the European and National Market (i.e. market size, offer and demand; market players; market infrastructure); the wholesale market; the retail market; margins and market prices in order to make suitable assessment energy efficiency proposals.	X	X	X	X	X	X			X	X	X	X		X
	Charges and tariff structuring The Unit aims to provide information about reading and interpreting the energy invoices, considering the electricity, gas and other energy sources tariff structures. The energy auditor tasks include a review of contracts for the supply of energy. It is therefore essential that the energy auditor acquires knowledge that will allow to evaluate the tariffs and their structure and eventually switch the energy supplier.	X	X	X	X	X	X	X		X	X	X	X		X
	Data analysis	X	X	X	X	X	X	X	X	X	X	X	X		X

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	The Unit aims to provide information on methodology of the data collection, analysis of energy consumptions and costs. The energy auditor shall collect and analyze all data concerning energy, including energy carriers, adjustment factors affecting energy consumption, information concerning the building.													
	Developing a building energy balance The Unit aims to provide the knowledge about methodology to develop an energy balance. One of the first steps of the energy auditor is to create an energy balance that represents the energy flows. This allows to locate critical energy consuming sectors of the building and at the same time identifies the energy losses areas. The capacity to create an energy balance is an essential skill of energy auditor.	X	X	X	X	X	X			X	X	X	X		X
	Energy performance indicators The Unit aims to provide information on calculation for the Energy Performance Indicators in accordance with the National Standards. Identifying the key energy performance indicators is vital for the planning process, as it provides energy auditors a clear overview of how their client uses energy and can highlight ways to manage resources better.	X	X	X	X	X	X	X		X	X	X	X		X
2. Legislation, regulations and	Regulations and procedures for procurement, tenders, working contracts, energy supply contracts - financial instruments The Unit aims to provide information on relevant regulations and procedures for procurement and tenders, working contracts and energy supply contracts, financial instruments at European and National level.	X	X		X	X	X	X		X		X	X	X	X

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	The energy auditor constantly analyze and use updated regulation and procedures recognized in this sector. It is essential and in some case compulsory that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.													
	European and National legislation concerning energy efficiency, renewables The Unit aims to provide the basis on the relevant European and National legislation concerning energy efficiency and renewables. The Energy auditor has to check the compliance of the energy audit to the regulations. It is therefore essential that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.	X	X	X	X	X	X	X	X	X	X	X	X	X
	European and National standards The Unit aims to provide information on the European and National standards, that can be useful to carry out an energy audit. The Energy auditor needs to have the tools to carry out the audit, ensuring the compliance with the relevant standards. It is therefore essential that energy auditor uses the schemes and produce documents according to standards both for quality of documents and for legal requirements.	X	X	X	X	X	X	X	X	X	X	X	X	X
3. Buildi	General information on the building market and the main elements of the construction process	X	X	X	X	X	X	X		X	X	X	X	X

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	The Unit aims to provide knowledge that energy auditor must obtain regarding the main types of buildings and their value in the market. The objective will be to supply relevant information related with the built environment and real estate market, including the status of the building (new, rehabilitated, under renovation, etc.).													
	Building evaluation in terms of: windows, roofs, doors, walls, air exchanges The Unit aims to provide the essentials of passive components of the buildings. The objective will be to supply relevant information related to identifying the components of the buildings, namely walls, roof, windows, floors, etc.	X	X	X	X	X	X	X		X	X	X	X		X
	Techniques, tools and calculation to improve energy efficiency The Unit aims to provide knowledge about thermal behaviour of the buildings, taking in account their insulation, shading devices and other relevant passive component and provide solutions for the improvement of the energy efficiency.	X	X	X	X	X	X	X		X	X	X	X		X
4.Heating, ventilation, air conditioning and hot water	Building systems evaluation The Unit aims to provide the essentials which energy auditor must obtain in the active components of the buildings. The auditor should be able to identify the equipment or systems and associated performance in terms of energy efficiency.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Techniques and tools to improve energy efficiency in the residential sector	X	X	X	X	X	X	X	X	X	X	X	X		X

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	The Unit aims to provide the Knowledge that energy auditor must obtain regarding the features of the active components of the buildings and their application in order to reduce the energy needs and to improve the energy efficiency of the building.													
	Calculation of energy savings and energy efficiency modernizations The Unit aims to provide the knowledge that energy auditor must obtain regarding application and calculation of energy savings of active components of the buildings. The auditor should be able to interpret and to apply the calculation methodologies for HVAC systems in the building in order to reduce the energy needs and to improve the energy efficiency of the building.	X	X	X	X	X	X	X		X	X	X	X		X
5.Lighting systems, domestic appliances and other energy consuming devices in residential sector	Basics of lighting and current lighting technologies The Unit aims to provide the general and basic information that energy auditor must obtain in the area of lighting	X	X	X	X	X	X	X		X	X	X	X		X
	Efficient artificial lighting systems, optimization and controlling lighting systems The Unit aims to provide the general solutions for optimization and control of lighting equipment and systems.	X	X	X	X	X	X	X		X	X	X	X		X
	Economic evaluation of lighting improvements The Unit aims to provide the general and basic information that energy auditor must obtain for economic evaluation of lighting improvements.	X	X	X	X	X	X	X		X	X	X	X		X
	Domestic appliances and other energy consuming devices The Unit aims to provide the general knowledge that energy auditor must obtain in the area of domestic appliances and other energy	X	X	X	X	X	X			X	X				

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	consuming devices													
6. Energy production from renewable energy sources in residential sector	PV systems The Unit aims to provide knowledge on techniques and tools of PV systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.	X	X	X	X	X	X	X		X	X	X	X	X	X
	Solar thermal systems The Unit aims to provide knowledge on techniques and tools of solar systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.	X	X	X	X	X	X	X		X	X	X	X	X	X
	Heat pumps The Unit aims to provide knowledge on techniques and tools of heat pumps installations. Energy auditor should be able to provide suitable variants of energy improvements in the residential sector	X	X	X	X	X	X	X		X	X	X	X	X	X
	Biomass (solid biofuels) The Unit aims to provide knowledge on techniques and tools of biomass boilers installations to be able to provide suitable propositions of energy improvements in the residential sector	X	X	X	X	X	X	X		X	X	X	X	X	X
	Procedures for integrating renewable energy systems The Unit aims to provide basilar information on integration of renewable energy systems, including hybrid solutions.	X	X	X	X	X	X	X		X	X	X	X	X	X
7. Eco	Financing and subsidies	X	X		X	X	X	X		X		X	X	X	X

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	The Unit aims to provide knowledge related to all the possibilities of public or private support (in terms of incentives and funding). It is therefore necessary for the energy auditor to identify available financial resources, as well as the schemes and mechanisms for getting hold of these resources in order to help to finance the energy efficiency actions.													
	Economic assessment The Unit aims to provide knowledge in the financial area and economic assessment. The energy auditor constantly uses concepts, tools and solutions involving economic elements and aspects. It is therefore essential that the energy auditor acquires knowledge that will allow him/her to evaluate and defend any situation in which economic aspects are relevant for the development of his/her business or service.	x	x		x	x	x	x		x		x	x	x	x
8.Energy audit methodology	Measuring and metering equipment The Unit aims to provide information on the main metering and measuring equipment and provide skills to manage the equipment necessary to conduct an energy audit and to understand the measurements results.	x	x		x	x	x			x		x	x	x	x
	Good practices and case studies The Unit aims to provide examples of best practices of residential buildings energy audits, in order to allow energy auditor to be familiar with different solutions. I also aims to show and practice methodology of preparing energy audit overview (case studies).	x	x	x	x	x	x			x	x	x	x	x	x

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	Monitoring, control and adjustment of energy consumption parameters The Unit aims to provide information on building energy management system as support, to control energy-consuming devices, monitor and report their performance. Moreover, this learning unit presents the fundamental principles of International Performance Measurement and Verification Protocol, the process of using measurement for determining actual savings.	X	X			X	X			X		X	X	X	X
9.Project management	Basics of project management The Unit aims to prepare the energy auditor to manage and coordinate his own work, starting from the preparation of offers, through the development of energy efficiency improvements, ending with monitoring the energy efficiency and evaluation of his work.	x	X		X	X	X			X		X	X	X	X
10. Communication and marketing	Communication techniques concerning energy audits The Unit aims to provide information concerning principles of communication and communication techniques for energy auditors. The energy auditor have to use a good communication techniques to allow building owners and other stakeholders (technicians, ESCo) a comprehensive understanding of energy consumption, energy action plan and other technical and financial aspects.	x	X		X	X	X			X		X	X		X
	Presentation of results and reporting	X	X		X	X	X			X		X	X		X

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	The Unit aims to provide the principles of presentation of results and reporting. The energy auditor constantly uses updated and proper templates for reporting results. The presentation of the results has to be comprehensive for the end users and other technicians, complete for all technical/financial aspects, useful for understanding the baseline energy consumption and for a fast implementation of the energy action plan.															

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4.2.2 ENACT Energy Auditor vs Chosen profession

Partners also prepared a matrix comparing the ENACT Energy Auditor with the most similar profession in the country (see table below).

As for the previous matrix, this comparison, grounded on learning outcomes architectures (assuming the recommended approach for ENACT valorization previously described), allow to foster a greater ENACT impact on the national VET system, job market segments and qualification frames, because it allows to identify the residual efforts to be undertaken to support the training and professional development of another energy- related professional profile (the "ENACT - closest" in each country).

Thanks to the learning outcomes- and ECVET- driven methodologies employed, this matrix also support the EU level impact because of enhanced comparison, adaptation and integration allowed

Consistently, together with the progressive impact realization along this and the previous matrix, the MoU among partners will be enlarged to the other learning outcomes/profiles addressed.

This, in turn, will promote the progressive definition of an organic and common training and job market system, also stimulating (on a bottom up process) the alignment of the relative qualifications.

The matrix (Annex 2) highlights in detail the differences in competences and knowledge of the two figures. Deep analysis of competences provides information on the specific subjects and skills which, later on, students of the course should learn and expand on their own. The differences between professions result from legislation and the demands in particular countries.

Profession compared with the the ENACT Energy Auditor

Italy	Expert in Energy Management
Poland	Energy Auditor
Portugal	Qualified Expert on Energy Certification of Buildings
Spain	Technician of Energy Certification

In Portugal, as stated before, the comparison will be between the Qualified Expert on Energy Certification of Buildings and the ENACT Energy Auditor. In this context, the ENACT Energy Auditor, as background, should have the skills and competences of a Qualified Expert on Energy Certification of Buildings, which will be complemented (specialized), through the ENACT training course, in the following themes:

- Energy consumption in the residential sector and general methodology for audits.
- Measurements techniques
- Energy characterization of facilities.
- Analysis of energy bills
- Measures for energy improvement
- Energy audit simulation

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- Preparation and elaboration of energy audit report

Matrix compares chosen profession with ENACT Energy Auditor which in detail describe differences in competences and knowledge. Deep analysis of competences provide information on specific subjects and skills which, later on, student of the course should learn and enlarge on their own. The differences between professions result from legislation and demands in particular countries.

The chosen profession in Spain is the Technician of Energy Certification, responsible for issuing energy performance certificates. In comparison with the ENACT Energy Auditor profile, this professional figure needs to acquire and increase knowledge about technical aspects (including, for example, those related to the tasks of an energy auditor or those related to energy savings), financing and subsidies, project management and communication.

In Portugal, the comparison was between the expert on energy certification of buildings and ENACT Energy Auditor. Such decision took in consideration the national situation and the analysis and comments from stakeholders, the ENACT energy auditor qualification scheme can contribute to expand the competences of an existing profession – the qualified expert on energy certification of buildings.

The chosen profession in Poland is the Energy Auditor because it is the most similar profile. This profession in Poland deals with preparation of energy audit for buildings according to legislation from 1999 (Act on Support for Thermal Refurbishment and Renovations (Dz.U 1999 No.162/98, pos.1121 and regulations related) This profile is aimed to prepare very specific energy audit in form of report to gain grants for thermos-modernization of building. It doesn't covers the competences needed to provide audit as a process (norm 16-247) also he/she misses the project management and communication skill and competences.

For Italy, it has been chosen to compare the ENACT energy Auditor with the Energy Management Expert, because it is the most similar profile. The energy audit is one of the compulsory task that Energy Management Expert must be able to do.

The Energy Management Expert combines the technical expertise with a solid expertise in environmental matters, business management and communication. He is also able to have the role of manager of energy management system for enterprises and public bodies. The Energy Management Expert can cover two sector: civil sector and industrial one.

The course for Enact Energy Auditor is specific for residential buildings, but it has been developed taking into account all the civil sector. So, assuming a modular approach, the ENACT Energy Auditor activities and competences represent bricks that can be progressively integrated within professional development paths related to the overall civil sector (including the tertiary sector and public administration), the industrial as well as the transport one.

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ENACT Energy Auditor vs Chosen profession

			Portugal	Spain	Poland	Italy
		ENACT EA	Qualified Expert on Energy Certification of Buildings	Technician of Energy Certification	Energy Auditor	Expert in energy management
1.Introduction to energy auditing in residential sector	Energy units, energy sources, unit conversion factors The Unit aims to provide basic information concerning the energy sources and the energy unit conversion factors. Energy conversion is a main aspect of energy management. The energy auditor constantly uses these concepts. Therefore it is essential that the energy auditor is familiar with them.	X	X	A profile with this training and knowledge knows these contents	X	X
	Principles of building physic and thermodynamic The Unit aims to provide fundamental concepts of thermodynamic and physics of the building that are crucial for the following more specialized modules. The energy auditor constantly uses these concepts in order to understand energy processes.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	X	X
	Energy auditing process	X	X	A profile with this training and	The process of carrying an	For Expert in Energy

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	The Unit aims to provide the general information to conduct an energy audit and guidance on how to carry out energy audits in accordance to the European standard 16247 or similar standards.			knowledge knows these contents	audit should be more focused on norm 16247.	management this unit needs to have integration including processes and transport competencies in order to effectively implement the requirements of EN 16247/3 and EN 16247/4
	Tasks and functions of a residential energy auditor The Unit aims to provide the requirements, tasks and activities of auditor in residential sector. It specifies the necessary competencies in order to effectively implement the requirements of EN 16247/1, which may be supplemented by the specific part EN 16247/2.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	Tasks and functions of energy auditor should be based on norm 16247.	X
	General features of the energy market	X	X		X	X

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	The Unit aims to provide information on the energy market and actors involved. In particular, the energy auditor constantly uses concepts and solutions involving energy market from the production to the distribution, transmission, and supply of energy sectors. Therefore it is essential that the energy audits were updated based on the main feature of the European and National Market (i.e. market size, offer and demand; market players; market infrastructure); the wholesale market; the retail market; margins and market prices in order to make suitable assessment energy efficiency proposals.					
	Charges and tariff structuring The Unit aims to provide information about reading and interpreting the energy invoices, considering the electricity, gas and other energy sources tariff structures. The energy auditor tasks include a review of contracts for the supply of energy. It is therefore essential that the energy auditor acquires knowledge that will allow to evaluate the tariffs and their structure and eventually switch the energy supplier.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	X	For Expert in Energy management this unit needs to be integrated with charges and tariff structuring for industrial sector
	Data analysis	X	X	A profile with this training and	X	X

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	The Unit aims to provide information on methodology of the data collection, analysis of energy consumptions and costs. The energy auditor shall collect and analyze all data concerning energy, including energy carriers, adjustment factors affecting energy consumption, information concerning the building.			knowledge DOESN'T know these contents but he should do so		
	Developing a building energy balance The Unit aims to provide the knowledge about methodology to develop an energy balance. One of the first steps of the energy auditor is to create an energy balance that represents the energy flows. This allows to locate critical energy consuming sectors of the building and at the same time identifies the energy losses areas. The capacity to create an energy balance is an essential skill of energy auditor.	X	X	A profile with this training and knowledge knows these contents	X	For Expert in Energy management this unit needs to have integration including processes and transport energy balance
	Energy performance indicators The Unit aims to provide information on calculation for the Energy Performance Indicators in accordance with the National Standards. Identifying the key energy performance indicators is vital for the planning process, as it provides energy auditors a clear overview of how their client uses energy and can highlight ways to manage resources better.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	X	For Expert in Energy management this unit needs to have integration including energy performance indicators for processes and transport

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2. Legislation, regulations and contracts in residential sector	Regulations and procedures for procurement, tenders, working contracts, energy supply contracts - financial instruments The Unit aims to provide information on relevant regulations and procedures for procurement and tenders, working contracts and energy supply contracts, financial instruments at European and National level. The energy auditor constantly analyze and use updated regulation and procedures recognized in this sector. It is essential and in some case compulsory that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	X	For Expert in Energy management this unit needs to have integration including particular regulation for processes and transport
	European and National legislation concerning energy efficiency, renewables The Unit aims to provide the basis on the relevant European and National legislation concerning energy efficiency and renewables. The Energy auditor has to check the compliance of the energy audit to the regulations.	X	X	A profile with this training and knowledge knows these contents	X	For Expert in Energy management this unit needs to have integration including particular legislation for processes and transport

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	It is therefore essential that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.					
	European and National standards The Unit aims to provide information on the European and National standards, that can be useful to carry out an energy audit. The Energy auditor needs to have the tools to carry out the audit, ensuring the compliance with the relevant standards. It is therefore essential that energy auditor uses the schemes and produce documents according to standards both for quality of documents and for legal requirements.	X	X	A profile with this training and knowledge knows these contents	X	For Expert in Energy management this unit needs to have integration including particular standards for processes and transport. Moreover, it is necessary to put attention on: ISO 50001 – Energy management systems -- Requirements, ISO 50002 Energy audits -- Requirements, ISO 14001 Environmental management systems -- Requirements
3. Building envelope	General information on the building market and the main elements of the construction process	X	X	A profile with this training and knowledge knows these contents	X	For Expert in Energy management this unit needs to be adapted to industrial

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	The Unit aims to provide knowledge that energy auditor must obtain regarding the main types of buildings and their value in the market. The objective will be to supply relevant information related with the built environment and real estate market, including the status of the building (new, rehabilitated, under renovation, etc.).					sectors (integration with innovative processes and knowledge of the main best available techniques applicable in the production system)
	Building evaluation in terms of: windows, roofs, doors, walls, air exchanges The Unit aims to provide the essentials of passive components of the buildings. The objective will be to supply relevant information related to identifying the components of the buildings, namely walls, roof, windows, floors, etc.	X	X	A profile with this training and knowledge knows these contents	X	
	Techniques, tools and calculation to improve energy efficiency The Unit aims to provide knowledge about thermal behaviour of the buildings, taking in account their insulation, shading devices and other relevant passive component and provide solutions for the improvement of the energy efficiency.	X	X	A profile with this training and knowledge knows these contents	X	

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4.Heating, ventilation, air conditioning and hot water systems in residential sector	Building systems evaluation The Unit aims to provide the essentials which energy auditor must obtain in the active components of the buildings. The auditor should be able to identify the equipment or systems and associated performance in terms of energy efficiency.	X	X	A profile with this training and knowledge knows these contents	X	X
	Techniques and tools to improve energy efficiency in the residential sector The Unit aims to provide the Knowledge that energy auditor must obtain regarding the features of the active components of the buildings and their application in order to reduce the energy needs and to improve the energy efficiency of the building.	X	X	A profile with this training and knowledge knows these contents	X	
	Calculation of energy savings and energy efficiency modernizations	X	X	A profile with this training and knowledge DOESN'T know	X	

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	The Unit aims to provide the knowledge that energy auditor must obtain regarding application and calculation of energy savings of active components of the buildings. The auditor should be able to interpret and to apply the calculation methodologies for HVAC systems in the building in order to reduce the energy needs and to improve the energy efficiency of the building.			these contents but he should do so		
5.Lighting systems, domestic appliances and other energy consuming devices in residential sector	Basics of lighting and current lighting technologies The Unit aims to provide the general and basic information that energy auditor must obtain in the area of lighting	X	X	A profile with this training and knowledge knows these contents	X	All concepts have to be adapted to industrial sector
	Efficient artificial lighting systems, optimization and controlling lighting systems The Unit aims to provide the general solutions for optimization and control of lighting equipment and systems.	X	X	A profile with this training and knowledge knows these contents	X	
	Economic evaluation of lighting improvements The Unit aims to provide the general and basic information that energy auditor must obtain for economic evaluation of lighting improvements.	X	X	A profile with this training and knowledge knows these contents	X	

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	Domestic appliances and other energy consuming devices The Unit aims to provide the general knowledge that energy auditor must obtain in the area of domestic appliances and other energy consuming devices	X	X	A profile with this training and knowledge knows these contents	Energy Auditor is not educated about domestic appliances	
6. Energy production from renewable energy sources in residential sector	PV systems The Unit aims to provide knowledge on techniques and tools of PV systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.	X	X	A profile with this training and knowledge knows these contents	X	All the concepts have to be adapted to industrial sector
	Solar thermal systems The Unit aims to provide knowledge on techniques and tools of solar systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.	X	X	A profile with this training and knowledge knows these contents	X	
	Heat pumps The Unit aims to provide knowledge on techniques and tools of heat pumps installations. Energy auditor should be able to provide suitable variants of energy improvements in the residential sector	X	X	A profile with this training and knowledge knows these contents	X	

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	Biomass (solid biofuels) The Unit aims to provide knowledge on techniques and tools of biomass boilers installations to be able to provide suitable propositions of energy improvements in the residential sector	X	X	A profile with this training and knowledge knows these contents	X	
	Procedures for integrating renewable energy systems The Unit aims to provide basilar information on integration of renewable energy systems, including hybrid solutions.	X	X	A profile with this training and knowledge knows these contents	X	
7. Economic assessment	Financing and subsidies The Unit aims to provide knowledge related to all the possibilities of public or private support (in terms of incentives and funding). It is therefore necessary for the energy auditor to identify available financial resources, as well as the schemes and mechanisms for getting hold of these resources in order to help to finance the energy efficiency actions.	**X**	**X**	A profile with this training and knowledge DOESN'T know these contents but he should do so	Due to constant changes in subsidy market, Energy Auditor have to educate himself about ways of financing energy efficient investments.	For Expert in Energy management this unit needs to update with incentives also applied to industry/processes
	Economic assessment	X	X	A profile with this training and	X	X

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	The Unit aims to provide knowledge in the financial area and economic assessment. The energy auditor constantly uses concepts, tools and solutions involving economic elements and aspects. It is therefore essential that the energy auditor acquires knowledge that will allow him/her to evaluate and defend any situation in which economic aspects are relevant for the development of his/her business or service.			knowledge DOESN'T know these contents but he should do so		
8.Energy audit methodology	Measuring and metering equipment The Unit aims to provide information on the main metering and measuring equipment and provide skills to manage the equipment necessary to conduct an energy audit and to understand the measurements results.	X	X	A profile with this training and knowledge knows these contents	X	For Expert in Energy management this unit needs to have integration including main metering and measuring equipment useful for processes and transport
	Good practices and case studies The Unit aims to provide examples of best practices of residential buildings energy audits, in order to allow energy auditor to be familiar with different solutions. I also aims to show and practice methodology of preparing energy audit overview (case studies).	X	X	A profile with this training and knowledge knows these contents	X	For Expert in Energy management this unit needs to be integrated with specific case studies related to industrial processes/ trasports
	Monitoring, control and adjustment of energy consumption parameters	X	X	A profile with this training and knowledge DOESN'T know	X	X

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	The Unit aims to provide information on building energy management system as support, to control energy-consuming devices, monitor and report their performance. Moreover, this learning unit presents the fundamental principles of International Performance Measurement and Verification Protocol, the process of using measurement for determining actual savings.			these contents but he should do so		
9.Project management	Basics of project management The Unit aims to prepare the energy auditor to manage and coordinate his own work, starting from the preparation of offers, through the development of energy efficiency improvements, ending with monitoring the energy efficiency and evaluation of his work.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	Energy Auditor course doesn't prepare for project management	For Expert in Energy management this unit needs to be integrated with project risks management
10. Communication and marketing	Communication techniques concerning energy audits The Unit aims to provide information concerning principles of communication and communication techniques for energy auditors.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	A profile with this training and knowledge DOESN'T know these contents and don't have any practical exercises	X

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	The energy auditor have to use a good communication techniques to allow building owners and other stakeholders (technicians, ESCo) a comprehensive understanding of energy consumption, energy action plan and other technical and financial aspects.					
	Presentation of results and reporting The Unit aims to provide the principles of presentation of results and reporting. The energy auditor constantly uses updated and proper templates for reporting results. The presentation of the results has to be comprehensive for the end users and other technicians, complete for all technical/financial aspects, useful for understanding the baseline energy consumption and for a fast implementation of the energy action plan.	X	X	A profile with this training and knowledge DOESN'T know these contents but he should do so	X	X

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4.2.3 Enlarged matrix with professionals not related to the energy auditing

The third matrix, (Annex 3), prepared by the partners shows the professions that could be interested in acquiring the qualification of the ENACT Energy Auditor but at the moment are not related to the energy auditing sector. These profession could benefit from acquiring knowledge and qualifications of the ENACT Energy Auditor which could help them with their actual work or give them new qualifications.

For this matrix are valid the same considerations reported for the previous one in terms of fostering national and EU ENACT impacts on employment and employability, by further enlarging the learning outcomes architectures comparison (and then adaptation and integration) to other professional profiles (and KSC structures). As previously stated, together with the progressive impact realization along this and the previous matrix, the MoU among partners will be enlarged to the other learning outcomes/profiles addressed..

Professions suggested by partners are shown down in the table below.

Professions not related to the energy auditing which could benefit from the ENACT qualification

Portugal	Italy	Spain	Poland
• Energy Auditor of residential sector	• Civil servant • Energy sellers • Building managers • Municipal technician • Certified and accredited RES installers • Energy agency technicians	• Installers • Engineers • Estate managers • Maintainer	• Energy seller • Estate administrator • Municipal technician • Civil servants dealing with energy

All of mentioned professions have knowledge similar to the ENACT Energy Auditor in some respects, however there is room for improvement in most of the topics which the course includes.

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CHOSEN PROFESSIONALS WITH POTENTIAL TO BECOME ENACT ENERGY AUDITOR

		Portugal	Italy						Spain				Poland			
	Chosen professionals with potential to become ENACT energy auditor	Energy Auditor of residential sector	Civil servants	Energy sellers	Building manager	Municipal technician (in energy sector)	Certified and accreditated RES installer	Energy Agency Technician	Installer	Engineers	Estate manager	Maintainer	Energy sellers	Estate manager	Municipal technician (in energy sector)	Civil servants dealing with energy
1.Introduction to energy auditing in residential sector	Energy units, energy sources, unit conversion factors The Unit aims to provide basic information concerning the energy sources and the energy unit conversion factors. Energy conversion is a main aspect of energy management. The energy auditor constantly uses these concepts. Therefore it is essential that the		X	X	X	X	X	X		X			X	X	X	X

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energy auditor is familiar with them.														
Principles of building physic and thermodynamic The Unit aims to provide fundamental concepts of thermodynamic and physics of the building that are crucial for the following more specialized modules. The energy auditor constantly uses these concepts in order to understand energy processes.					X	X	X	X	X				X	
Energy auditing process The Unit aims to provide the general information to conduct an energy audit and guidance on how to carry out energy audits in accordance to		X			X		X	X	X	X	X			

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the European standard 16247 or similar standards.															
Tasks and functions of a residential energy auditor The Unit aims to provide the requirements, tasks and activities of auditor in residential sector. It specifies the necessary competencies in order to effectively implement the requirements of EN 16247/1, which may be supplemented by the specific part EN 16247/2 .	**x**	x	x	x	x		x	x	x	x	x		x		
General features of the energy market			x				x		x	x	x	x	x	x	x

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	The Unit aims to provide information on the energy market and actors involved. In particular, the energy auditor constantly uses concepts and solutions involving energy market from the production to the distribution, transmission, and supply of energy sectors. Therefore it is essential that the energy audits were updated based on the main feature of the European and National Market (i.e. market size, offer and demand; market players; market infrastructure); the wholesale market; the retail market; margins and market prices in order to make suitable assessment energy efficiency															

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proposals.														
Charges and tariff structuring The Unit aims to provide information about reading and interpreting the energy invoices, considering the electricity, gas and other energy sources tariff structures. The energy auditor tasks include a review of contracts for the supply of energy. It is therefore essential that the energy auditor acquires knowledge that will allow to evaluate the tariffs and their structure and eventually switch the energy	**X**		X		X		X		X			X	X	X	X

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supplier.														
Data analysis The Unit aims to provide information on methodology of the data collection, analysis of energy consumptions and costs. The energy auditor shall collect and analyze all data concerning energy, including energy carriers, adjustment factors affecting energy consumption, information concerning the building.	**X**		X		X		X		X	X	X	X	X	X	X
Developing a building energy balance The Unit aims to provide the knowledge about methodology to develop an energy balance. One of the					X		X	X	X	X	X		X	X	

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first steps of the energy auditor is to create an energy balance that represents the energy flows. This allows to locate critical energy consuming sectors of the building and at the same time identifies the energy losses areas. The capacity to create an energy balance is an essential skill of energy auditor.															
Energy performance indicators The Unit aims to provide information on calculation for the Energy Performance Indicators in accordance with the National Standards. Identifying the key energy performance indicators is vital for the planning process, as it		X	X	X	X		X		X	X		X	X	X	X

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	provides energy auditors a clear overview of how their client uses energy and can highlight ways to manage resources better.														
2. Legislation, regulations and contracts in residential sector	Regulations and procedures for procurement, tenders, working contracts, energy supply contracts - financial instruments The Unit aims to provide information on relevant regulations and procedures for procurement and tenders, working contracts and energy supply contracts, financial instruments at European and National level. The energy auditor constantly analyze and use updated regulation and procedures recognized in this sector. It is		X		X	X		X		X	X		X	X	X	X

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	essential and in some case compulsory that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.														
	European and National legislation concerning energy efficiency, renewables The Unit aims to provide the basis on the relevant European and National legislation concerning energy efficiency and renewables. The Energy auditor has to check the compliance of the energy audit to the regulations. It is therefore essential that energy auditor uses the schemes and produce documents according to law both for quality of		x	x	x	x	x	x	x	x		x	x		x	x

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	documents and for legal requirements.														
	European and National standards The Unit aims to provide information on the European and National standards, that can be useful to carry out an energy audit. The Energy auditor needs to have the tools to carry out the audit, ensuring the compliance with the relevant standards. It is therefore essential that energy auditor uses the schemes and produce documents according to standards both for quality of documents and for legal requirements.					X		X	X	X	X	X	X		X	X
3. Building	General information on the building market and the main elements of the				X	X		X	X	X		X	X	X	X	X

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	construction process The Unit aims to provide knowledge that energy auditor must obtain regarding the main types of buildings and their value in the market. The objective will be to supply relevant information related with the built environment and real estate market, including the status of the building (new, rehabilitated, under renovation, etc.).														
	Building evaluation in terms of: windows, roofs, doors, walls, air exchanges The Unit aims to provide the essentials of passive components of the buildings. The objective will be to supply relevant information related to identifying the components of the					X		X		X		X		X	X	X

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	buildings, namely walls, roof, windows, floors, etc.														
	Techniques, tools and calculation to improve energy efficiency The Unit aims to provide knowledge about thermal behaviour of the buildings, taking in account their insulation, shading devices and other relevant passive component and provide solutions for the improvement of the energy efficiency.				X	X		X	X	X				X	
4.Heating, ventilation, air	Building systems evaluation The Unit aims to provide the essentials which energy auditor must obtain in the active components of the buildings. The auditor should be able to identify the equipment or systems and	**X**			X	X	X	X	X	X	X	X		X	X	X

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	associated performance in terms of energy efficiency.														
	Techniques and tools to improve energy efficiency in the residential sector The Unit aims to provide the Knowledge that energy auditor must obtain regarding the features of the active components of the buildings and their application in order to reduce the energy needs and to improve the energy efficiency of the building.	**X**			X	X	X	X	X	X		X			X	X
	Calculation of energy savings and energy efficiency modernizations The Unit aims to provide the knowledge that energy auditor must obtain regarding application and	**X**				X	X	X		X					X	

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	calculation of energy savings of active components of the buildings. The auditor should be able to interpret and to apply the calculation methodologies for HVAC systems in the building in order to reduce the energy needs and to improve the energy efficiency of the building.														
5.Lighting systems, domestic appliances and other energy	Basics of lighting and current lighting technologies The Unit aims to provide the general and basic information that energy auditor must obtain in the area of lighting	**x**			x	x		x	x	x		x	x	x	x	x
	Efficient artificial lighting systems, optimization and controlling lighting systems The Unit aims to provide the general solutions for optimization and control of lighting equipment and	**x**			x	x		x	x	x		x		x	x	x

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	systems.														
	Economic evaluation of lighting improvements The Unit aims to provide the general and basic information that energy auditor must obtain for economic evaluation of lighting improvements.	**X**				X		X			X				
	Domestic appliances and other energy consuming devices The Unit aims to provide the general knowledge that energy auditor must obtain in the area of domestic appliances and other energy consuming devices	**X**			X	X		X	X	X	X	X			
6. Energy production	PV systems The Unit aims to provide knowledge on techniques and tools of PV systems. Energy auditor should be				X	X	X	X	X	X		X			X	X

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	able to provide suitable propositions of energy improvements in the residential sector.														
	Solar thermal systems The Unit aims to provide knowledge on techniques and tools of solar systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.				X	X	X	X	X	X		X			X	X
	Heat pumps The Unit aims to provide knowledge on techniques and tools of heat pumps installations. Energy auditor should be able to provide suitable variants of energy improvements in the residential				X	X	X	X	X	X	X	X			X	X

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	sector														
	Biomass (solid biofuels) The Unit aims to provide knowledge on techniques and tools of biomass boilers installations to be able to provide suitable propositions of energy improvements in the residential sector				X	X	X	X	X	X	X	X			X	X
	Procedures for integrating renewable energy systems The Unit aims to provide basilar information on integration of renewable energy systems, including hybrid solutions.				X	X		X	X	X	X	X				
7. Economic	Financing and subsidies The Unit aims to provide knowledge related to all the possibilities of public or private	**X**	X		X	X	X	X			X		X	X	X	X

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	support (in terms of incentives and funding). It is therefore necessary for the energy auditor to identify available financial resources, as well as the schemes and mechanisms for getting hold of these resources in order to help to finance the energy efficiency actions.														
	Economic assessment The Unit aims to provide knowledge in the financial area and economic assessment. The energy auditor constantly uses concepts, tools and solutions involving economic elements and aspects. It is therefore essential that the energy auditor acquires knowledge that will allow him/her to evaluate and defend any	**X**	X			X	X	X			X		X	X	X	X

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	situation in which economic aspects are relevant for the development of his/her business or service.														
8.Energy audit methodology	Measuring and metering equipment The Unit aims to provide information on the main metering and measuring equipment and provide skills to manage the equipment necessary to conduct an energy audit and to understand the measurements results.	**X**	X			X	X	X	X			X			
	Good practices and case studies The Unit aims to provide examples of best practices of residential buildings energy audits, in order to allow energy auditor to be	**X**				X		X			X	X			

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	familiar with different solutions. I also aims to show and practice methodology of preparing energy audit overview (case studies).														
	Monitoring, control and adjustment of energy consumption parameters The Unit aims to provide information on building energy management system as support, to control energy-consuming devices, monitor and report their performance. Moreover, this learning unit presents the fundamental principles of International Performance Measurement and Verification Protocol, the process of using measurement for	**X**	X		X	X		X	X			X			

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	determining actual savings.														
9.Project management	Basics of project management The Unit aims to prepare the energy auditor to manage and coordinate his own work, starting from the preparation of offers, through the development of energy efficiency improvements, ending with monitoring the energy efficiency and evaluation of his work.		X		X	X		X			X	X			X	X
10. Communication and marketing	Communication techniques concerning energy audits The Unit aims to provide information concerning principles of communication and communication techniques for					X		X					X			

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	energy auditors. The energy auditor have to use a good communication techniques to allow building owners and other stakeholders (technicians, ESCo) a comprehensive understanding of energy consumption, energy action plan and other technical and financial aspects.														
	Presentation of results and reporting The Unit aims to provide the principles of presentation of results and reporting. The energy auditor constantly uses updated and proper templates for reporting results. The presentation of the results has to be comprehensive for	**X**				X		X							

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	the end users and other technicians, complete for all technical/financial aspects, useful for understanding the baseline energy consumption and for a fast implementation of the energy action plan.															

At the Italian level, this comparison efforts has been further developed, by deepening the analysis of the ENACT learning outcomes (and already available resources) "relevance" and potential valorization with refer to both:

- the main professional profiles belonging to the "ENACT enlarged professional families"
- the competences needs emerged from the scenario/job market need analysis , allowing to address additional ENACT targets and potentials not necessary related to certified and/or complete professional profiles.

This analysis has been developed also on the bases of specific communication and valorization actions undertaken at Italian level with trainers, energy agencies and VET and research centers to share the potential ENACT national impact and valorisation base with both segments (professional families and competence needs), also with refer to common activities to be undertaken. For example, the active dialogue with the Bricks, I Town and other EU projects has allowed to share a common path to jointly valorize educational resources (mainly on an OER perspective) for the energy efficiency competences and jobs demand and supply. This activities have been undertaken also to support the common action to valorize the integration of the ENACT profile and qualification schema within the regional and national frames, previously reported, supporting, thus, its impact on the harmonization of the qualification system.

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		ENACT enlarged professional families					"MARKET" NEED ANALYSIS					
		Energy Auditor (D. Law 102/14)	Energy Management Expert	Energy Manager	Energy certifier	Boiler Inspector	Civil servants	Energy sellers	Building manager	Municipal technician (in energy sector)	Certified and accredited RES installer	Energy Agency Technician
1.Introduction to energy auditing in residential sector	Energy units, energy sources, unit conversion factors The Unit aims to provide basic information concerning the energy sources and the energy unit conversion factors. Energy conversion is a main aspect of energy management. The energy auditor constantly uses these concepts. Therefore it is essential that the energy auditor is familiar with them.	X	X	X	X	X	X	X	X	X	X	X
	Principles of building physic and thermodynamic The Unit aims to provide fundamental concepts of thermodynamic and physics of the building that are crucial for the following more specialized modules. The energy auditor constantly uses these concepts in order to understand energy processes.	X	X	X	X	X				X	X	X
	Energy auditing process	X	X	X			X			X		X

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The Unit aims to provide the general information to conduct an energy audit and guidance on how to carry out energy audits in accordance to the European standard 16247 or similar standards.											
Tasks and functions of a residential energy auditor The Unit aims to provide the requirements, tasks and activities of auditor in residential sector. It specifies the necessary competencies in order to effectively implement the requirements of EN 16247/1, which may be supplemented by the specific part EN 16247/2.	X	X	X			X	X	X	X		X
General features of the energy market	X	X	X				X				X

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The Unit aims to provide information on the energy market and actors involved. In particular, the energy auditor constantly uses concepts and solutions involving energy market from the production to the distribution, transmission, and supply of energy sectors. Therefore it is essential that the energy audits were updated based on the main feature of the European and National Market (i.e. market size, offer and demand; market players; market infrastructure); the wholesale market; the retail market; margins and market prices in order to make suitable assessment energy efficiency proposals.											
Charges and tariff structuring The Unit aims to provide information about reading and interpreting the energy invoices, considering the electricity, gas and other energy sources tariff structures. The energy auditor tasks include a review of contracts for the supply of energy. It is therefore essential that the energy auditor acquires knowledge that will allow to evaluate the tariffs and their structure and eventually switch the energy supplier.	X	X	X	X			X		X		X
Data analysis	X	X	X	X	X		X		X		X

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The Unit aims to provide information on methodology of the data collection, analysis of energy consumptions and costs. The energy auditor shall collect and analyze all data concerning energy, including energy carriers, adjustment factors affecting energy consumption, information concerning the building.											
Developing a building energy balance The Unit aims to provide the knowledge about methodology to develop an energy balance. One of the first steps of the energy auditor is to create an energy balance that represents the energy flows. This allows to locate critical energy consuming sectors of the building and at the same time identifies the energy losses areas. The capacity to create an energy balance is an essential skill of energy auditor.	X	X	X						X		X
Energy performance indicators The Unit aims to provide information on calculation for the Energy Performance Indicators in accordance with the National Standards. Identifying the key energy performance indicators is vital for the planning process, as it provides energy auditors a clear overview of how their client uses energy and can highlight ways to manage resources better.	X	X	X	X		X	X	X	X		X

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2. Legislation, regulations and contracts in residential sector	Regulations and procedures for procurement, tenders, working contracts, energy supply contracts - financial instruments The Unit aims to provide information on relevant regulations and procedures for procurement and tenders, working contracts and energy supply contracts, financial instruments at European and National level. The energy auditor constantly analyze and use updated regulation and procedures recognized in this sector. It is essential and in some case compulsory that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.	X	X	X	X		X		X	X		X
	European and National legislation concerning energy efficiency, renewables The Unit aims to provide the basis on the relevant European and National legislation concerning energy efficiency and renewables. The Energy auditor has to check the compliance of the energy audit to the regulations. It is therefore essential that energy auditor uses the schemes and produce documents according to law both for quality of documents and for legal requirements.	X	X	X	X	X	X	X	X	X	X	X
	European and National standards	X	X	X	X	X				X		X

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	The Unit aims to provide information on the European and National standards, that can be useful to carry out an energy audit. The Energy auditor needs to have the tools to carry out the audit, ensuring the compliance with the relevant standards. It is therefore essential that energy auditor uses the schemes and produce documents according to standards both for quality of documents and for legal requirements.										
3. Building envelope	General information on the building market and the main elements of the construction process The Unit aims to provide knowledge that energy auditor must obtain regarding the main types of buildings and their value in the market. The objective will be to supply relevant information related with the built environment and real estate market, including the status of the building (new, rehabilitated, under renovation, etc.).	X	X	X	X				X	X		X
	Building evaluation in terms of: windows, roofs, doors, walls, air exchanges The Unit aims to provide the essentials of passive components of the buildings. The objective will be to supply relevant information related to identifying the	X	X	X	X					X		X

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	components of the buildings, namely walls, roof, windows, floors, etc.										
	Techniques, tools and calculation to improve energy efficiency The Unit aims to provide knowledge about thermal behaviour of the buildings, taking in account their insulation, shading devices and other relevant passive component and provide solutions for the improvement of the energy efficiency.	X	X	X	X				X	X		X
4.Heating, ventilation, air conditioning and hot water	Building systems evaluation The Unit aims to provide the essentials which energy auditor must obtain in the active components of the buildings. The auditor should be able to identify the equipment or systems and associated performance in terms of energy efficiency.	X	X	X	X	X			X	X	X	X
	Techniques and tools to improve energy efficiency in the residential sector The Unit aims to provide the Knowledge that energy auditor must obtain regarding the features of the active components of the buildings and their application in order to reduce the energy needs and to improve the energy efficiency of the building.	X	X	X	X	X			X	X	X	X

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	Calculation of energy savings and energy efficiency modernizations The Unit aims to provide the knowledge that energy auditor must obtain regarding application and calculation of energy savings of active components of the buildings. The auditor should be able to interpret and to apply the calculation methodologies for HVAC systems in the building in order to reduce the energy needs and to improve the energy efficiency of the building.	X	X	X	X					X	X	X
5.Lighting systems, domestic appliances and other energy consuming devices in residential sector	Basics of lighting and current lighting technologies The Unit aims to provide the general and basic information that energy auditor must obtain in the area of lighting	X	X	X	X				X	X		X
	Efficient artificial lighting systems, optimization and controlling lighting systems The Unit aims to provide the general solutions for optimization and control of lighting equipment and systems.	X	X	X	X				X	X		X
	Economic evaluation of lighting improvements The Unit aims to provide the general and basic information that energy auditor must obtain for economic evaluation of lighting improvements.	X	X	X	X					X		X

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	Domestic appliances and other energy consuming devices The Unit aims to provide the general knowledge that energy auditor must obtain in the area of domestic appliances and other energy consuming devices	X	X	X					X	X		X
6. Energy production from renewable energy sources in residential sector	PV systems The Unit aims to provide knowledge on techniques and tools of PV systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.	X	X	X	X				X	X	X	X
	Solar thermal systems The Unit aims to provide knowledge on techniques and tools of solar systems. Energy auditor should be able to provide suitable propositions of energy improvements in the residential sector.	X	X	X	X				X	X	X	X
	Heat pumps The Unit aims to provide knowledge on techniques and tools of heat pumps installations. Energy auditor should be able to provide suitable variants of energy improvements in the residential sector	X	X	X	X				X	X	X	X

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	Biomass (solid biofuels) The Unit aims to provide knowledge on techniques and tools of biomass boilers installations to be able to provide suitable propositions of energy improvements in the residential sector	X	X	X	X				X	X	X	X
	Procedures for integrating renewable energy systems The Unit aims to provide basilar information on integration of renewable energy systems, including hybrid solutions.	X	X	X	X				X	X		X
7. Economic assessment	Financing and subsidies The Unit aims to provide knowledge related to all the possibilities of public or private support (in terms of incentives and funding). It is therefore necessary for the energy auditor to identify available financial resources, as well as the schemes and mechanisms for getting hold of these resources in order to help to finance the energy efficiency actions.	X	X	X	X		X		X	X	X	X
	Economic assessment	X	X	X	X		X			X	X	X

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	The Unit aims to provide knowledge in the financial area and economic assessment. The energy auditor constantly uses concepts, tools and solutions involving economic elements and aspects. It is therefore essential that the energy auditor acquires knowledge that will allow him/her to evaluate and defend any situation in which economic aspects are relevant for the development of his/her business or service.										
8.Energy audit methodology	Measuring and metering equipment The Unit aims to provide information on the main metering and measuring equipment and provide skills to manage the equipment necessary to conduct an energy audit and to understand the measurements results.	X	X	X			X			X	X	X
	Good practices and case studies The Unit aims to provide examples of best practices of residential buildings energy audits, in order to allow energy auditor to be familiar with different solutions. I also aims to show and practice methodology of preparing energy	X	X	X						X		X

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	audit overview (case studies).										
	Monitoring, control and adjustment of energy consumption parameters The Unit aims to provide information on building energy management system as support, to control energy-consuming devices, monitor and report their performance. Moreover, this learning unit presents the fundamental principles of International Performance Measurement and Verification Protocol, the process of using measurement for determining actual savings.		X	X			X		X	X		X
9.Project management	Basics of project management The Unit aims to prepare the energy auditor to manage and coordinate his own work, starting from the preparation of offers, through the development of energy efficiency improvements, ending with monitoring the energy efficiency and evaluation of his work.	X	X	X			X		X	X		X
10. Communication	Communication techniques concerning energy audits The Unit aims to provide information concerning principles of communication and communication techniques for	X	X	X						X		X

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	energy auditors. The energy auditor have to use a good communication techniques to allow building owners and other stakeholders (technicians, ESCo) a comprehensive understanding of energy consumption, energy action plan and other technical and financial aspects.										
	Presentation of results and reporting The Unit aims to provide the principles of presentation of results and reporting. The energy auditor constantly uses updated and proper templates for reporting results. The presentation of the results has to be comprehensive for the end users and other technicians, complete for all technical/financial aspects, useful for understanding the baseline energy consumption and for a fast implementation of the energy action plan.	X	X	X					X		X

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11. Communication and marketing	Principles of organisation and management of enterprises		X	X								
12. Technological systems for enterprises	It includes: 1. Basics of electrical engineering, elements of electrical measurements and electrical Safety 2. Evolution of the concept of maintenance 3. Cogeneration and trigeneration (CHP & CCHP) 4. Electric engines 5. Inverter 6. Compressed air 7. Cold production 8. Vacuum production 9. Heating recuperator 10. Power factor corrector		X	X								

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13. Specific module for selectedRES technology (60 hours: 30h :theory and 30h: practice)											X	

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SYSTEM AND RESOURCES RECOMMENDATION

VALORISING ENACT PROGRAM, SYSTEM AND RESOURCES AT NATIONAL AND EU LEVEL WITHIN PREGRESSIVELY ENLARGING PROFESSIONAL AREAS AND JOB MARKET

1. ENACT system, program and resources can be further valorize at each national level as well as European based program (supported by ECVET and compliant with the EU standard 16247) to support the professional development of residential Energy Auditor;
2. Its valorization and further improvements are related to the improvement (defined according to the specific targets involved) of system usability (multi-language and mobile learning); enhanced participants interaction.
3. The improvement of **experiential learning methodologies (both in distance and in-presence)** and the **learning and supporting materials enrichment and/or contents deepening** (with reference to both "technical" and transversal learning outcomes) taking into account different implementation contexts (in terms of educational level and/or geographical context) and/or participant profiles;
4. ENACT system, program and resources can be aligned over time according to the relevant scenarios and transferred to **other countries** that recognized the Energy Auditor for Residential Sector.
5. ENACT system, program and resources can be valorized and integrated within an enlarged energy efficiency **professional families, as well as to other emerging competence need**.
6. **Transfers, alignments and improvements need to be done** according to the approach recommended for ENACT program and profile and modifying consistently the ECVET frame (and the related enlargement of the partnership).

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5. CONCLUSIONS: THE OVERVIEW OF ENACT RECOMMENDATIONS

The triple-E challenge, integrating education, employment and environment joint development, emerges as both ENACT input and output. The joint view on the recommendations developed per each of ENACT relevant results area (qualification and professional profile; program; system and resources) highlight in fact how expected national and EU main impacts are related to the progressive improvement and alignment of the qualification frames, the employment of regional and learning outcomes driven program and resources design approaches, the empowerment of both demand and supply energy efficiency services dimension enhancement. Here following are reported in an integrated table the recommendation developed and commented in each part.

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POLICY RECOMMENDATION – FOSTERING DEMAND AND SUPPLY ECOSYSTEMS ENHANCING ENERGY AUDITOR JOB MARKET, CONSUMERS AWARENESS AND TRUST	▸ Defining long term strategies, policies (including incentives and funding schema) integrating employment, environment and education
	▸ Introducing incentives schemas supporting the take up of the actions provided within a "regular" energy auditing
	▸ Focusing on awareness-raising activities at national/regional level concerning the existing funding opportunities available for consumers, in order to achieve national/regional policy goals, stimulate market demand and increase labor market relevance.
	▸ Building trust through transparencies and promoting/validating certified professionals networks and certified Energy Auditing VET centres
	▸ Providing in legislation compulsory auditing for the residential sector
	▸ Providing in legislation compulsory training for acquiring and/or renew the certification (also in terms of not formal training by enhancing companies availability of training on the job)
	▸ Harmonising the national legislations the unified methodology of energy audit with wide spectrum of EU standards
QUALIFICATION RECOMMENDATIONS PROMOTING A COMMON QUALIFICATION SCHEMA AND SYSTEM BASED ON MULTIACTORIAL, COMPREHENSIVE AND LEARNING OUTCOME DRIVEN APPROACH	▸ Valorize a common energy auditor qualification schema (and related professional systems), in term of both dynamic integration within regional/national qualification frame and within European professional standards
	▸ Promote articulated cooperation among the different national and regional actors that allows the unification of actions, criteria and resources for an integrated qualification framework of energy auditors and other market-relevant professional figures, and that contributes to overcome barriers in the development of market
	▸ Assume a methodological and conceptual approach in supporting qualification schema integration and alignment over time based on some core dimensions: ○ *comprehensive approach;* ○ *long term commitment;* ○ *regional approach;* ○ *learning outcome driven approach (supporting profile* alignment, personalized processes and not formal learnig).

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VALORISING ENACT PROGRAM, SYSTEM AND RESOURCES AT NATIONAL AND EU LEVEL WITHIN PREGRESSIVELY ENLARGING PROFESSIONAL AREAS AND JOB MARKET	▸ system, program and resources can be further valorize at each national level as well as European based program (supported by ECVET and compliant with the EU standard 16247) to support the professional development of residential Energy Auditor; ▸ Its valorization and further improvements are related to the improvement (defined according to the specific targets involved) of system usability (multi-language and mobile learning); enhanced participants interaction. ▸ The improvement of **experiential learning methodologies (both in distance and in-presence)** and the **learning and supporting materials enrichment and/or contents deepening** (with reference to both "technical" and transversal learning outcomes) taking into account different implementation contexts (in terms of educational level and/or geographical context) and/or participant profiles; ▸ ENACT system, program and resources can be aligned over time according to the relevant scenarios and transferred to other countries that recognized the Energy Auditor for Residential Sector. ▸ ENACT system, program and resources can be valorized and integrated within an enlarged energy efficiency professional families, as well as to other emerging competence need. ▸ **Transfers, alignments and improvements need to be done** according to the approach recommended for ENACT program and profile and modifying consistently the ECVET frame.

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