

ENACT

Energy Auditors Competencies, Training and profiles

O2|

ENACT program and learning resources

Operative Plan

O2A4|ENACT profile and program validation

Project Title	Energy Auditors Competencies, Training and Profiles
Acronym	ENACT
Grant Agreement Number	2014-1-IT01-KA202-002672
Deliverable Number	O2
Deliverable Name	O2 ENACT program and learning resources <i>ENACT profile and program validation (O2A4)</i>
Date of Delivery	Rev. 0 – 08/02/2016
Author(s): Person Name / Partner	Valentina Castello / AISFOR

Table of Content

Document overview	3
ENACT Energy Auditor profile and program validation.....	4
1. National scenario.....	4
2. ENACT validation	5
2.1 Stakeholders involved	5
2.2 Activities carried on	5
2.3 Inputs/Materials utilized	5
2.4 Evidences collected	5
2.5 Focus on potential integration in national VET	6
2.6 Focus on potential integration in NQF.....	6
Annexes.....	6

Document overview

The present document is aimed at propose and share the O2A4 national report template, aimed at highlighting the main actors involved, activities carried out and evidences collected within the profile, qualification schema and training program of the ENACT Energy Auditor.

Aisfor will then collect all the national reports, developed by each partner and realize a compared and integrated O2A4 report.

ENACT Energy Auditor profile and program validation

1. National scenario	<p>Energy Auditor According to law about thermo-modernisation and renovation from 21st of November 2008, energy auditor makes documentation defining range, technical and economical parameters of undertaking and propose the most optimal solution. The audit is mandatory for thermo-modernisation subsidy from Polish Economy Bank(BGK) There are no regulation about who can perform the energy audit.</p>
	<p>Energy Efficiency Auditor According to law about energy efficiency from 15th of April 2011, auditor performs audit for the purpose of "White certificates" or to present savings of enterprises considering building envelope and all system used for industrial reasons. The profession is regulated by Ministry of Economy.</p>
	<p>Qualification Schemes Exist only for Energy Efficiency Auditor. For energy auditor there are no qualification scheme as quality of energy audits is ensured by law. Energy Efficiency Audits can be performed only by authorise certifiers who need to fulfil one of these conditions:</p> <ul style="list-style-type: none"> - have Master of Science degree and finished course; - complete the other higher studies and postgraduate studies, which the program takes into account issues related to the energy efficiency of buildings , performing energy audits of buildings, construction energy saving and renewable energy sources;
	<p>Certifications There aren't any obligatory certificates for energy auditor. All the courses are voluntary. One of the certificates is granted by KAPE</p>
	<p>Main Actors</p> <ul style="list-style-type: none"> - National Energy Conservation Agency training and authorization for energy auditor of buildings - Association of Energy Auditors - Energy Conservation Foundation

2. ENACT validation	
2.1 Stakeholders involved	KAPE contacted many actors working with energy efficiency in Poland, to gather their opinion about ENACT profile and program, the biggest group including energy auditors, educational and scientific personnel from various Polish technical universities, representative from local administration units and civil engineers.
2.2 Activities carried on	<p>KAPE hosted a discussion after national ENACT multiplayer events which gathered a diverse group of stakeholders, mainly Energy Auditors. KAPE employees participated in different meetings like "Forum termomodernizacja" or ECVET conference, it was a good occasion to inform on the Project ENACT project and Qualification Scheme, get contacts and collect feedbacks in short interviews.</p> <p>KAPE collected answers on question attached in annex.</p> <p>All the stakeholders received detailed information about project to precise their opinion.</p>
2.3 Inputs/Materials utilized	All the stakeholders were contacted by phone or email. Later they received Qualification Scheme and questionnaire, with specially prepared questions, to collect their feedback.
2.4 Evidences collected	<p>According to work profile proposed profession and the range of work are more similar to Energy Advisor rather that Auditor.</p> <p>Stakeholders were discussing if there is a need for energy advisor, if all the work could be done by an architect who were trained in energy efficiency.</p>
	According to training programme – stakeholders claim that remote training doesn't warrant learning and that there is a need for more practical classes.

	Entry level criteria are correct, but in case of different courses, the condition of one year experience is unclear – there should be defined areas of experience which gives the ability to become ENACT Energy Auditor.
	According to evaluating scheme – the condition of passing final exam might be insufficient, stakeholders think that ENACT Energy Auditor should take practice under the supervision of a person who has experience or specific qualifications. Verification as a test is highly insufficient.
	According to certification – the course might be valuable for energy certifiers, architects, engineers and will contribute to increase knowledge and range of provided services.
2.5 Focus on potential integration in national VET	No evidence were collected
2.6 Focus on potential integration in NQF	No evidence were collected
Annexes	<ol style="list-style-type: none"> 1) Translated Qualification scheme prepared by the consortium for validation purposes 2) Questionnaire used for collection of feedback by e-mail and/or phone 3) Note from 2nd multiplayer event in Poland

Annex 1) Qualification scheme prepared by the consortium for validation purposes



Schemat kwalifikacji audytora energetycznego ENACT

Metodologia pracy

Profil zawodowy ENACT został stworzony na podstawie analizy wymaganych przez rynek pracy czynności oraz odpowiadających im osiągnięciom wiedzy, umiejętności i kompetencji biorąc pod uwagę:

- krajowe (i regionalne) ramy kwalifikacji w każdym z krajów partnerskich (IT, ES, PT, PL),
- europejski standard EN 16247 i włoski standard UNI CEI 13339 do spraw ekspertów zarządzanie energią,
- inne krajowe i regionalne standardy odnoszące się do kwalifikacji związanych z audytem energetycznym budynków.

Biorąc pod uwagę założenia projektu ENACT, schemat kwalifikacji i program szkoleniowy został opracowany zgodnie z Europejskim system akumulowania i przenoszenia osiągnięć w kształceniu i szkoleniu zawodowym (ECVET – European Credit System for Vocational Education and Training). ECVET jest dobrowolną inicjatywą UE przyczyniającą się do realizacji wspólnych celów rozwoju kształcenia i szkolenia w Europie spójnych ze strategią Europa 2020 tj.

Tak więc przy tworzeniu schematu kwalifikacji i programu szkoleniowego uwzględniono perspektywę uczenia się przez całe życie: stopniowe zdobywania umiejętności i/lub potwierdzanie poszczególnych kompetencji zdobytych w różnych kontekstach (formalnym, poza formalnym i nieformalnym).

Tym samym zakres czynności i program szkolenia charakteryzuje modułowość tj. efekty uczenia się i program został podzielony tak aby stopniowo można było rozwijać/potwierdzać umiejętności zawodowe a tym samym umożliwić rozwój zawodowy również w innych obszarach z sektora usług i administracji publicznej, przemysłowego czy transportu.

Profil audytora energetycznego ENACT

Audytora energetyczny ENACT zawodowo zajmuje się przeprowadzaniem audytów energetycznych w sektorze mieszkaniowym.

Audytora energetyczny ENACT jest odpowiedzialny za realizację audytu w budynkach mieszkalnych, począwszy od zebrania danych, pracę w terenie, aż po analizę i kontakt z klientem. Ważne jest to, że poza identyfikacją możliwości poprawy wykorzystania energii, audytora energetyczny ENACT uczestniczy w ich wdrażaniu i monitoruje osiągniętą poprawę w zakresie zużycia i produkcji energii a także redukcji kosztów.

Profil zawodowy ENACT został opisany w czterech głównych kategoriach (Zarządzanie, Audyt, Planowanie, Wdrażanie/Monitoring) wraz z charakterystycznymi dla nich działaniami.

Zadania audytora energetycznego

Kategoria	Działania
1. Zarządzanie	<ul style="list-style-type: none"> Planowanie audytu energetycznego pod względem zakresu, zarządzania czasem i zasobami Koordinacja Zarządzanie konfliktami Komunikacja i raportowanie
2. Audyt	<ul style="list-style-type: none"> Zbieranie danych oraz przeprowadzenie badań i pomiarów Diagnoza stanu istniejącego budynku i systemów HVAC
3. Planowanie	<ul style="list-style-type: none"> Określenie przedsięwzięć poprawiających wydajność systemów zintegrowanych w budynku Ocena ekonomiczna sugerowanych rozwiązań Analiza rozwiązań technicznych zmniejszających zużycie energii Określenie optymalnego zakresu inwestycji zmniejszających zużycie energii Opracowanie planu działań prowadzących do osiągnięcia założonych rezultatów
4. Wdrażanie/Monitoring	<ul style="list-style-type: none"> Wdrożenie wybranych przedsięwzięć poprawy efektywności energetycznej Monitorowanie zużycia energii Wsparcie i nadzór

Audytór Energetyczny ENACT – Opis szkolenia

Zgodnie z profilem zawodowym określonym poprzez wyżej wymienione zadania i określone wymagane zasoby wiedzy, umiejętności i kompetencji (*załącznik nr 2*) przewiduje się organizację 80 godzinnego kursu szkoleniowego.

Poniższa tabela przedstawia w sposób całościowy program szkolenia pod względem:

- **Struktury efektów uczenia się i czasu trwania**

Szczegółowy program szkolenia uwzględniający podział na jednostki szkoleniowe program zawiera *załącznik nr 1*;

- **Metodyki szkolenia oraz oceniania**

- **Punktacji ECVET**

Razem 6 punktów ECVET zostało przypisanych dla całego kursu (80 godzin). Punkty ECVET zostały przypisane do modułów kursu zgodnie z przyjętą metodą punktacji ważonej, biorąc pod uwagę 3 aspekty: czasu trwania modułu (pod względem liczby godzin), oceny i metodologii szkoleń i poziomu trudności

Moduł	Ilość godzin	Metodologia	Metodologia Oceniania	Ecvet
1. Wprowadzenie do audytu energetycznego	12	Materiały online Wykład (online lub na miejscu) Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
2. Legislacja, regulacje i umowy w sektorze mieszkaniowym	5	Materiały online Wykład (online lub na miejscu) Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
3. Obudowa zewnętrzna budynku	9	Materiały online – Wykład (online lub na miejscu) Ćwiczenia/Symulacja/ Laboratorium - Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
4. Ogrzewanie, wentylacja, klimatyzacja, chłodzenie oraz instalacje ciepłej wody użytkowej	8	Materiały online – Wykład (online lub na miejscu) Ćwiczenia/Symulacja/ Laboratorium - Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
5. Systemy oświetlenia i urządzenia gospodarstwa	7	Materiały online – Wykład (online lub na miejscu)	Pytania wielokrotnego	0,5

domowego w budynkach mieszkalnych		Ćwiczenia/Symulacja/Laboratorium - Prowadzący online	wyboru (10 pytań)	
6. Produkcja energii ze źródeł odnawialnych w sektorze mieszkaniowym	10	Materiały online Wykład (online lub na miejscu) Ćwiczenia/Laboratorium Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
7. Ocena ekonomiczna	6	Materiały online – Wykład (online lub na miejscu) Symulacja - Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
8. Metodologia przeprowadzania audytu energetycznego	13	Materiały online – Symulacja, ćwiczenia, praca projektowa Prowadzący online	Pytania wielokrotnego wyboru (10 pytań) i/lub studium przypadku	1,5
9. Zarządzanie projektem	4	Materiały online Wykład (online lub na miejscu) Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5
10. Komunikacja i marketing	6	Materiały online Wykład (online lub na miejscu) Prowadzący online	Pytania wielokrotnego wyboru (10 pytań)	0,5

Schemat oceniania

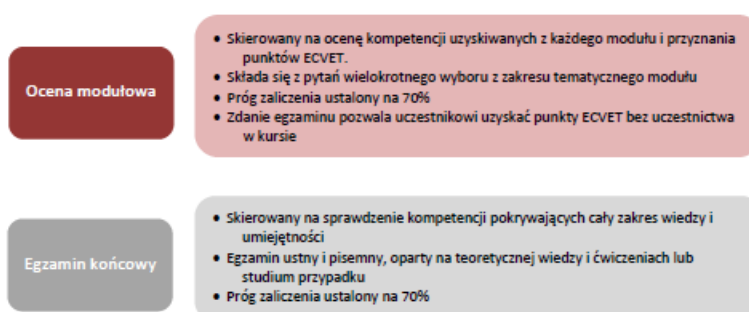
Szkolenie ma charakter modułowy tj. skonstruowany jest z 10 części o niezależnym charakterze. Każdy moduł jest oceniany oddzielnym testem, którego zaliczenie pozwala na uzyskanie punktów ECVET. Test może być wypełniany przed uczestnictwem w zajęciach co pozwoli na ominięcie tej części kursu.

W ten sposób uczestnik może wybrać, w zależności od wcześniej uzyskanych kompetencji/kwalifikacji, które moduły zna i chce ominąć, a które chciałby uzupełnić.

Zaliczenie wszystkich modułów umożliwi przystąpienie do egzaminu końcowego, który pozwoli na otrzymanie dyplomu potwierdzającego zakończenie kursu.

Kryteria wejściowe

- Zalecany poziom wiedzy/doświadczenia ustalony w tabeli nr 3. poniżej
- Egzamin wstępny: weryfikuje wiedzę wymaganą do uczestnictwa w kursie, składa się z 30 pytań wielokrotnego wyboru pokrywających materiał zawarty w kursie
- Próg zaliczenia egzaminu ustalony na 50%

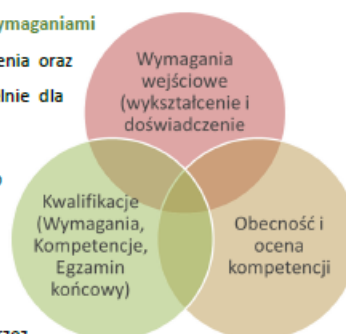


Schemat oceny stanowi także wewnętrzną część **Porozumienia o współpracy ECVET** pomiędzy partnerami realizującymi projekt ENACT.

WYMAGANIA KWALIFIKACYJNE DLA AUDYTORA ENERGETYCZNEGO ENACT

Schemat wymagań kwalifikacyjnych jest przedstawiony w trzech etapach:

- 1) Minimalne wymagania kwalifikacyjne zwane też **wymaganiami wejściowymi** są określone przez poziom wykształcenia oraz zdobyte doświadczenie zawodowe określone oddzielnie dla każdego kraju (tabela nr 3)
- 2) **Udział i zaliczenie** kursu szkoleniowego ENACT i/lub **potwierdzenie kompetencji zawodowych** odpowiadających poszczególnym efektom uczenia się dla profilu zawodowego ENACT,
- 3) **Egzamin kwalifikacyjny** przeprowadzany przez akredytowane instytucje i/lub instytucje branżowe/ szkoleniowe /certyfikujące





Kandydaci są dopuszczani do egzaminu kwalifikacyjnego gdy wykażą się posiadaniem wymagań określonych w pkt. 1 i 2 zapisanych w życiorysie .

Ad 1. Kryteria wejściowe

Wymagania wejściowe są określone na różnych poziomach w zależności od kraju. Podsumowanie znajduje się w poniższej tabeli:

	Edukacja	Doświadczenie/przepracowane lata
Włochy	Technical degree	0
	Technical diploma	2
	Other degree	3
	Other diploma	3
Polska	Degree on engineering or architecture recognized by the respective professional association	0
	Other degree	1
Portugalia	Degree on engineering or architecture recognized by the respective professional association	0
	Other degree	1
	Technical degree	
Hiszpania	Technical diploma/ degree	0
	Vocational educational training of 2 years	1
		3

Ad. 2 Uczestnictwo w kursie szkoleniowym i/lub potwierdzenie kompetencji

Jak wskazano poniżej , schemat kwalifikacji wymaga :

- **udział i pozytywne ukończenie** zgodnie ze schematem oceniania kursu ENACT *albo* udokumentowanie udziału i pozytywnego ukończenia w ciągu ostatnich 2 lat innych szkoleń obejmujących zakres tematyczny (wiedza, umiejętności, kompetencje) dla profilu zawodowego audytora ENACT

i/lub

- **wykazanie się kompetencjami zawodowymi** potwierdzonymi przez instytucje branżowe/ szkoleniowe /certyfikujące



Ad 3. Egzamin kwalifikacyjny przeprowadzany przez akredytowane instytucje lub/i instytucje branżowe/ szkoleniowe /certyfikujące.

Egzamin składa się z etapów: (uwzględniając UNI EN 16247/5)

1) weryfikacja życiorysu

1) test wielokrotnego wyboru, składającego się z 20 pytań

2) test pisemny oparty na studium przypadku

3) egzamin ustny bazujący na studium przypadku i innych obszarach z zakresu profilu zawodowego ENACT

Próg zaliczenia dla każdego z trzech testów ustalono na 70%.

Egzamin kwalifikacyjny prowadzony jest przez radę egzaminacyjną złożoną z co najmniej dwóch członków posiadających wiedzę i umiejętności z dziedziny audytów energetycznych w sektorze mieszkaniowym.

UTRZYMYWANIE KWALIFIKACJI AUDYTORA ENERGETYCZNEGO ENACT

Kwalifikacje Audytora energetycznego ENACT są ważne 5 lat. Audytorzy energetyczni ENACT zachowują swoje kwalifikacje poprzez aktualizację i uzupełnianie niezbędnej wiedzy i umiejętności technicznych do przeprowadzenia audytu energetycznego. Weryfikacja kwalifikacji będzie prowadzona poprzez analizę programów nauczania, udział w konferencjach / seminariach.



załącznik nr 1

Zakres programowy szkolenia:

1. Wprowadzenie do audytu energetycznego – 12 h
 - 1.1. Źródła energii, jednostki energetyczne, zamiana jednostek – 1 h
 - 1.2. Podstawy fizyki budowli i termodynamiki – 1 h
 - 1.3. Proces przeprowadzania audytu energetycznego – 2 h
 - 1.4. Zadania i funkcje audytora energetycznego w sektorze mieszkaniowym – 1 h
 - 1.5. Ogólna charakterystyka rynku energii – 2 h
 - 1.6. Rodzaje opłat i taryf – 1 h
 - 1.7. Analiza danych – 2 h
 - 1.8. Sporządzenie bilansu energetycznego budynku – 1 h
 - 1.9. Wskaźniki charakterystyki energetycznej – 1 h
2. Legislacja, regulacje i umowy w sektorze mieszkaniowym – 5 h
 - 2.1. Przepisy i procedury dotyczące zamówień, ofert, umów na usługi energetyczne – 2 h
 - 2.2. Europejskie i krajowe akty prawne w obszarze efektywności energetycznej i OZE – 2 h
 - 2.3. Europejskie i krajowe normy – 1 h
3. Obudowa zewnętrzna budynku – 9 h
 - 3.1. Podstawowe informacje o rynku budowlanym i głównych etapach procesu budowlanego – 2 h
 - 3.2. Ocena budynku pod kątem okien, dachu, drzwi, ścian, cyrkulacji powietrza – 3 h
 - 3.3. Poprawa efektywności energetycznej budynku: technologie, narzędzia i kalkulacje – 4 h
4. Ogrzewanie, wentylacja, klimatyzacja, chłodzenie oraz instalacje ciepłej wody użytkowej – 8 h
 - 4.1. Ocena systemów budynku – 2 h
 - 4.2. Poprawa efektywności energetycznej systemów budynku – 3 h
 - 4.3. Kalkulacja oszczędności energii i/lub przedsięwzięć poprawy efektywności energetycznej – 3 h
5. Systemy oświetlenia i urządzenia gospodarstwa domowego w budynkach mieszkalnych – 7 h
 - 5.1. Podstawy oświetlenia i obecne technologie oświetleniowe, w tym systemy zarządzania – 1 h

ANNEX 1 – THE KSC SCHEMA PER LEARNING OUTCOME AND LEARNING UNIT

Module	LEARNING UNIT	n	Description	Knowledge	Skills	Competencies
1. Introduction to energy auditing in residential sector	1	1	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.	Knowledge of energy sources (primary and secondary; conventional and renewables); energy unit definition and conversion factors; GHG emission factors; GHG effect; forms of energy; European and National scenario.	Ability to manage perfectly the physical quantities and conversion factors in order to verify and validate the measurements, make comparisons and have a good background for drawing up the energy audit.	Competent in understanding and applying energy units, conversion factors, identifying and managing energy sources.
	2	1	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.	Knowledge of physical and thermodynamic principles related to energy (e.g. thermal, electrical, heat transfer, fluid mechanics, theoretical basis of lighting, etc.).	Ability to understand the physical and thermodynamic principles, underlying energy conversion processes also dynamic and static energy management aspects as applied in buildings.	Competent in understanding the physical and thermodynamic processes linked to the building energy use and related fluxes.
	3	2	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 of energy auditing principles, methodology and deliverables as described by EN 16247 (parts 1, 2) standard or similar standards.	Ability to apply energy audit principles and methodology	Competent in understanding and applying principles and methodologies of energy audit described in EN 16247 standard or similar.
	4	1	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.	Knowledge of the core activities he may performs.	Ability to understand the scope and the boundaries of the energy audit and relating activities	Competent in applying the EA tasks with reference to the scope and thoroughness of the energy audit
	5	2	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	Knowledge of the energy market (energy production, distribution, transmission, supply) and market players (i.e. Energy Manager, Energy management expert, ESCO, energy suppliers).	Ability to understand the energy market context, proposing options and make comparisons.	Competent in finding market opportunities for energy efficiency investments and cost savings.

			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.			
6	Charges and tariff structuring	1	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.	Knowledge of metering equipment, tariffs and tariff structures.	Ability to read the utility tariff, bearing in mind the time of use rates, the peak charges, the usage profile, the demand charges, green power offerings and contractual obligations in order to propose suitable solutions to reduce the energy expenses.	Competent in understanding of the various energy tariffs and making a metering plan for the data collection and analysis and to reduce energy supply costs
7	Data analysis	2	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 of data collection methods useful for the energy audit and method of analysis.	Ability to collect information through effective interviewing, listening, observing, measuring, reviewing documents, records and data. Ability to assess and act on the quality of the data provided by the customer.	Competent in verifying and validating the collected data and competent in assessing factors that may affect the reliability of the energy audit findings.
8	Developing a building energy balance	1	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.	Knowledge of baseline consumptions; direct consumer impact; end users consumptions (heating, hot domestic water, lighting ...) and the adjustment factors in order to establish an energy balance.	Ability to quantify and analyze energy consumption, energy consumption breakdown. The energy auditor shall be able how to use metering models or calculations to determine the actual energy use profile and primary energy demand.	Competent in explaining the energy balance supported by reliable calculations
9	Energy performance indicators	1	The Unit aims to provide information on calculation for the Energy Performance Indicators in accordance with the National Standards. Identifying the key energy	Knowledge of reference indicators (benchmarks and standards) and current energy performance indicators.	Ability to identify and reviewing one or more energy performance indicators and identification	Competent in understanding if the energy performance indicators are in line with the scope of the audit.

			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.		of factors that may affect them. The energy auditor should be able to propose and calculate suitable energy performance indicators to quantify the energy performance and compare it to existing references (benchmarks, standards). Ability to use correctly ready-available energy performance indicators.	Competent in measuring the effectiveness of the energy management efforts and to identify inefficient areas with low energy performances.	
		12					
2. Legislation, regulations and contracts in residential sector	1	Regulations and procedures for procurement, tenders, working contracts, energy supply contracts - financial instruments	2	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.	Knowledge of existing regulations and procedures for procurement and tenders, working contracts and energy supply contracts, financial instruments. For each regulation and procedure knows the field of application, information and competitive conditions, transparency of award procedures, definition of technical specifications.	Skills to perform and to choose the best solution of contract and or procedure to improve the energy performance of the buildings. The choices have to be done considering the actions plan, the amount of the cost, the payback period and other economical and financial aspects, the technological reliability, the know-how and the availability of key actors.	Competent in implementing procurement and tenders, working contracts, energy supply contracts and financial instruments according to different regulations, laws and procedures. It is important that auditor implements procurement and tenders also considering best practice (available on websites or other sources), adaptation for the specific action plan.
	2	European and National legislation concerning energy efficiency, renewables	2	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.	Knowledge of existing relevant laws, policies, rules, regulations and directives at European and national level concerning energy efficiency and renewables.	Ability to understand the relationships among the different laws, policies, rules, regulations and shall be able to apply them related to energy audit.	Competent in applying of regulations, directives, etc, related to energy efficiency and renewables.
	3	European and National standards	1	The Unit aims to provide information on the European and National standards, that can be useful to carry out an energy audit.	Knowledge of existent European and national standards concerning energy auditing for	Skills to check if the auditing and the proposed improvement of the	Competent in finding the proper standards applicable to energy audit and in

				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.	building sector.	building energy performance are according to standards. The selection have to be done considering all the compulsory aspects and also other features aspects such as technical implementation, methodology and templates included in standards.	verifying if documentation and identified action plan are in accordance with them.
			5				
3. Building envelope	1	General information on the building market and the main elements of the construction process	2	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.).	Knowledge and relevant information about the building market and the methodologies associated to the buildings construction (new and existing).	Skills to evaluate the building market and identification of methodology of construction for each type of building, in accordance with the norms and regulations.	Competent in working with the different typology of buildings, identification of construction techniques and their accomplishment with the norms and regulations.
	2	Building evaluation in terms of: windows, roofs, doors, walls, air exchanges	3	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.	Knowledge of the passive components of the buildings, the materials used and the energy characterization of opaque and transparent building envelope elements	Ability to evaluate a building in terms of passive components and their impact in the building energy efficiency.	Competent in assessing the thermal behaviour of the buildings and the expected energy efficiency and thermal comfort.
	3	Techniques, tools and calculation to improve energy efficiency	4	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.	Knowledge of the thermal components of the building, namely the calculation of the thermal transmission ratios, plain and linear thermal bridges, and the identification of thermal comfort areas and spaces without air conditioning. Knowledge of energy efficient improvement opportunities and possible different solution for implementation.	Ability to perform and develop projects of thermal behaviour of buildings. Ability to calculate energy savings and energy efficiency improvements. Ability to recommend energy efficiency improvement opportunities and possible different solutions for implementation.	Competent in the calculation of thermal behaviour of buildings, identification of passive solutions and energy efficiency, aiming to improve the thermal comfort of the building.
				9			
4. Heating, ventilation, air conditioning and hot water systems in residential	1	Building systems evaluation	2	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	Knowledge of the main equipment of heating, ventilation and air conditioning (HVAC) systems and equipment for water heating, as well as	Ability to identify the different equipment and systems in terms of energy efficiency and other technical data.	Competent in the verification and accomplishment of the different active equipment and systems.

sector			performance in terms of energy efficiency.	associated technical features, assessment and verification of the accomplishment of regulations and energy efficient construction in the design of HVAC systems in the buildings of the residential sector.			
	2	Techniques and tools to improve energy efficiency in the residential sector	3	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.	Knowledge of the active components of the building (systems and equipment), their performance and utilization aiming to reduce energy consumption and/or to increase the energy efficiency of the building.	Ability to perform, develop and assess the HVAC projects and to identify measures to improve the energy efficiency of HVAC systems.	Competent regarding the energy optimization of HVAC systems for the buildings, including gas boilers, heat pumps and equipment for water heating
	3	Calculation of energy savings and energy efficiency modernizations	3	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.	Knowledge of methodology of calculation aiming to improve energy efficiency and to evaluate the measures to obtain energy savings in the projects of active systems and equipment of buildings of the residential sector.	Skills to identify measures and associated calculation to improve the energy efficiency of the active components of the buildings of the residential sector.	Competent regarding verification of calculation for the energy optimization of the active components of the buildings, including gas boilers, heat pumps and equipment for water heating.
			8				
5. Lighting systems, domestic appliances and other energy consuming devices in residential sector	4	Basics of lighting and current lighting technologies	1	The Unit aims to provide the general and basic information that energy auditor must obtain in the area of lighting	Knowledge of basic theory (light, output, intensity, density, lighting intensity, equipment to measure light parameters, colour temperature, colour rendering index). Luminous efficiency of different light sources, kind of lighting (indoor and outdoor lighting - with applicable standards and the EU Directives).	Ability to understand the information and technical data in lighting area	Competent in understanding among the different lighting technologies which is the most appropriate for each purpose
		Efficient artificial lighting systems, optimization and controlling lighting systems	2	The Unit aims to provide the general solutions for optimization and control of lighting equipment and systems.	Knowledge of different solutions for reducing the intensity of light flux, optimization of natural and artificial lighting systems. Advantages and disadvantages of control	Skills in understanding when is possible to use available technologies. Ability to collect data, calculate lighting performance and	Competent in analyzing the electricity consumption (real and theoretical) from lighting in the residential building, provide suitable energy efficiency improvements and

				systems and their basic properties. Preparation of preliminary lighting modernization project	understand advantages of controlling systems, propose suitable improvements	calculate energy saving.
	Economic evaluation of lighting improvements	2	The Unit aims to provide the general and basic information that energy auditor must obtain for economic evaluation of lighting improvements.	Knowledge in collecting data collection and types of indicators (usage time of light source, installed power and new installation power) Simplified methods of energy and cost saving calculation Best practice - example of calculation	Skills in collecting comprehensive data and preparing preliminary economic lighting modernization proposition. Skills in using the simplified methods of calculations	Competent in analyzing the electricity consumption and cost from lighting in the residential building and provide lighting improvements information of investment and energy saving cost.
	Domestic appliances and other energy consuming devices	2	The Unit aims to provide the general knowledge that energy auditor must obtain in the area of domestic appliances and other energy consuming devices	Knowledge of electricity consumption in residential sector - potential cost savings and energy efficiency of domestic appliances and devices, energy efficiency labelling (energy star)	Skills in understanding the information and technical data in the area of domestic appliance and in collecting data and use them for calculations	Competencies in analyzing the electricity consumption from domestic appliances and devices in the residential building and propose suitable energy efficiency improvements.
		7				
6. Energy production from renewable energy sources in residential sector	1. PV systems	2	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.	Knowledge of types of modules and inverters of PV systems as well as their detailed technical data (power, efficiency) availability of solar radiation and methods of estimation of energy income good and bad practices of installation PV systems in buildings	Ability to estimate the size of PV system considering energy income from installation, energy need of residential building and installation capacity (i.e. roof space...)	Competent in selecting the appropriate PV system for the building in the residential sector according to its demands and conditions.
	2. Solar thermal systems	2	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.	Knowledge of types of solar thermal systems as well as their detailed characteristic and measures (power, efficiency), availability of solar radiation and methods of estimation of energy income good and bad practices of installation solar thermal systems in buildings	Ability to propose the best type of solar system (natural or forced circulation - flat panels or vacuum tube ...). Ability to estimate the size of solar thermal system considering the energy income from installation, energy need of residential building and installation capacity (i.e.	Competent in selecting the appropriate solar system for the building in the residential sector according to its demands and conditions.

	3	Heat pumps	2	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	Knowledge of types of heat pumps and their principle of operation as well as detailed characteristic and measures (energy efficiency indicators – SPC/COP) Knowledge in characteristic of lower energy source and methods of power installation estimation and calculation of energy balance of heat pump. Good and bad practices of usage heat pumps in buildings.	Ability to propose the appropriate type of heat pump, specify power installation and calculation of energy balance of heat pump in order to select and size the installation for specific residential building	Competent in selecting the appropriate heat pump to the building in the residential sector according to its demands and conditions.
	4	Biomass (solid biofuels)	2	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	Knowledge of characterization of solid biofuels and emission of pollutants technology, types of boilers and systems using solid biofuel as well as their parameters and specification value chain for biomass and conditions of fuel storage good practices of usage solid biofuels in buildings.	Ability to specify power installation and conditions for biomass logistic. Ability to select and size the installation for specific residential building.	Competent in selecting the appropriate biomass installation for the building in the residential sector according to its demands and conditions
	5	Procedures for integrating renewable energy systems	2	The Unit aims to provide basilar information on integration of renewable energy systems, including hybrid solutions.	Knowledge of useful hybrid / integrated systems including innovative solutions	Ability to adopt solutions relating integrated systems or hybrid installations taking into consideration the peculiarities of the building.	Competent in applying the procedures for integrating renewable energy systems, taking care of technical and economic feasibility.
				10			
7. Economic assessment	1	Financing and subsidies	1	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.	Knowledge about all the different possibilities of public/ private financial incentive measures, but also about the accessing procedures.	Skills to detect and control all the possible public/ private incentives, manage them properly and process the ones that could be appropriate depending on the customer or the solution presented.	Competent in understanding and applying incentives.

8. Energy audit methodology	2	Economic assessment	4	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 of financial terminology as economic rates of return (payback), investment formulas, calculation of depreciation and amortization, financial projections, deviations, risk analysis, estimates of cost saving.	Ability to make suitable economic assessment take into account the lifetime equipment, the related costs and the financial measures	Competent in developing economic and financial analysis and defend any kind of technical project against third parties, guaranteeing the result of energy saving, economic and investment.
	Total		6				
	1	Measuring and metering equipment	3	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.	Knowledge of metering and measurement equipment (i.e. steam analyzers, thermographic cameras, loggers, manometers, thermometers, laser measurement equipment)	Ability to identify and manage the equipment to carry out an energy audit as well as correct interpretation of obtained results	Competent in understanding and validating the results of measurements with measuring and metering equipment.
	2	Good practices and case studies	6	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. It also aims to show and practice methodology of preparing energy audit overview (case studies).	Knowledge about energy audits applied to residential buildings aiming to improve their energy efficiency, reduce their energy consumption and bring related economic and environmental benefits.	Ability to adapt to encountered situations and to make feasible proposals for improvements. Identification in the best way any possible failures, and the improvement possibilities as well as being able to evaluate and determine the behavior of the solutions to solve the existent failures.	Competent in identifying quickly any possible problem or failure and develop the sustainable strategies that lead to an improvement of the initial situation.
9. Project management	3	Monitoring, control and adjustment of energy consumption parameters	4	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.	Knowledge of common practice in measuring, computing and reporting savings achieved by energy efficiency projects at end user facilities. Knowledge of building automation and mechanisms of regulation and control.	Ability to make a monitoring plan within the scope of the energy audit and to calculate the energy savings.	Competent in assessing energy savings and making corrective actions.
	1	Basics of project management	4	The Unit aims to prepare the energy auditor to manage and coordinate his own	Basic knowledge of management and project	Project management and methodology skills.	Competent in managing the complete energy audit

			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.	management	Organisational skills.	process from the planning of energy audit, to the implementation and monitoring of energy efficiency results, to the preventing and resolving conflicts.
		4				
10. Communication and marketing	1	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, ESCOs) a comprehensive understanding of energy consumption, energy action plan and other technical and financial aspects.	Knowledge of principles of communication (including principles of interpersonal communications, the effective communication, the business communication, the technical and financial communication, the marketing concepts and theoretical structures, the strategic marketing, the operational marketing) Communication techniques to advise technical and non technical end users in an adequate manner on all aspects of the energy audit.	Good communication skills to be able to articulate and well communicate concepts and ideas with technical and non-technical persons.	Competent in communicating and marketing in relation to all the aspects connected to the energy audit process. Competent in understanding the customer's goals, needs and expectations concerning the energy audit.
	2	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.	Knowledge of presenting energy audits results and reporting considering available existing templates (including checklist) according to standards (EN16247 and similar) and in the methodology/techniques to adapt and/or to modify templates considering available assessment data and results.	Ability to use/modify available templates or to create new ones for presentation of results and reporting, adapting to the scope of the audit. All aspects (e.g. the end users, the energy and environmental assessment of building envelope and technological systems, the financial aspects, the energy saving within the action plan, the compulsory and the optional aspects of the legislation and standards)	Competent in using and filling templates for the best communication and marketing of energy audit results. Competence in producing comprehensive, functional and well organized documents within the purpose.
		6				

Annex 2) Questionnaire used for collection of feedback by e-mail

- czy przekazany opis jest wystarczający?
 - czy kryteria wejściowe na szkolenie są odpowiednie do sytuacji w Polsce i przedstawionego zakresu merytorycznego programu?
 - czy szkolenie wpisuje się w specyfikę rynku edukacji/szkoleniowego w Polsce?
 - czy i jak szkolenie może zostać wykorzystane przez studentów/ innych osób? czy może być przydatne?
 - czy i jak szkolenie może się przydać dla funkcjonujących zawodów z sektora budownictwa/ energetyki funkcjonujących na rynku?
 - czy propozycja zakresu programu szkoleniowego jest wystarczająca / dobrze opisana?
- z góry dziękujemy za uwagi merytoryczne do programu

Annex 3) Note from 2nd multiplayer event in Poland

Notatki z dyskusji spotkanie ENACT 19.04

p. Stefan Hnatiuk - jeśli będzie funkcjonował doradca jaka rolę będzie spełniał projektant?

na rynku po stronie dostawców energii koszty uzasadnione będą mniejsze i inwestycja użytkownika może być nieopłacalna

proponuje kontrola wskaźników końcowych – wskaźników efektów

a. węglarz ustosunkował się do wypowiedzi

doradca przygotowuje wytyczne do rozmów z projektantem

handel energią zamieniamy w handel usługami energetycznymi

Dariusz Koc

Konflikt projektant vs doradca – projektanci powielają schematy

Może będzie zbędna jak się projektanci doedukują

Radosław szczęśniak Instytut Partnerstwa Publiczno Prywatnego

Potrzebny będzie się dynamicznie rozwijał! Wierzę,

Projektant projektuje i zostawia a doradca bierze odpowiedzialność. Podpisuje się potrafi ocenić która inwestycja jest ekonomicznie nieuzasadniona.

Termomodernizacja budynków publicznych – jest w formule PPP (buduje zarządza i jeśli nie osiągnie efektu płaci karę)

Węglarz

Anioł stróż, pilnował

Joanna Iwanik – Józefów

Czy potrzebny doradca w gminie...Konieczny - bardzo potrzebny jest doradca który zapanuje nad

Jest niezbędny odgórny przykaz, żaden burmistrz nie zrobi tego sam z siebie

W małych gminach

Węglarz : czy certyfikacja /akredytacja jest potrzebna

Iwanik : osoba z doświadczeniem

Węglarz: ustawa o certyfikacji

Iwanik : proces weryfikacji kwalifikacji musi być! jakaś jedna instytucja nie 10

ENACT O2A4 VALIDATION REPORT POLAND.docx

Page 25

Marysia:

Iwanik: Program Rys nie ruszył ale Pani Iwaniuk próbowała namówić mieszkańców którzy potrzebowali Doradcy – Doradca w gminach dla społeczeństwa

Osoba z końca Sali

Koordynator energetyczny ??? audyt czy aud it

Mam działkę z basenem chętnie bym ogrzewał ale mi to ukradną. Wiele aspektów trzeba uporządkować. Brak porządku w polityce energetycznej .. rozważyć

Projektant doradca??

POŁĄCZENIA ZESPOŁOWE? ZINTEGROWANE PROJEKTOWANIE – TECHNOLOGII BEEM

Doradca jak Za

Anna Ceroń QEMS Jakość Środowisko Bezpieczeństwo:

w nawiązaniu do wypowiedzi poprzednika

W każdym zespole powinien być Audytor

Specjalista energetyk + planista + audytor

Katarzyna Bańkowska FAPA Instytut Wsi i Rolnictwa - co w tej chwili napędza koniunkturę?? Czy przepisy czy rynek? czy termomodernizacja jest bo właściciele chcą czy muszą spełniać normy

Certyfikacja wewnętrzna - poświadczenie kompetencji jakości jest konieczna , certyfikacja musi być prowadzona przez rzetelne instytucje

Upowszechnienie wiedzy na wsi – dostęp do technologii

Freelancer czy etat w gminie??