

# O2 “ENACT program and learning resources”

## ENACT course description

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## 1. DOCUMENT OVERVIEW

The output leader RENAEL has coordinated the partners efforts in order to propose and share the ENACT course program, including timeline, modules and learning units descriptions, ECVET points foreseen.

## 2. GOAL AND METHODOLOGY

ENACT is aimed at defining a common European frame of the professional qualification and competences for energy auditors, necessary to respond to the job market skill needs, to foster mobility, employability and a real learning outcomes base learning, educational and employment (and employability) strategy.

According to the O1 “Energy auditors competences and professional profiles” evidences and profiles, O2 “ENACT course description” defines the ENACT training program, highlighting modules, contents, methodologies as well as the ECVET frame.

The methodologies applied concern:

- ✓ Desk analysis of existing course contents relating to energy professional profiles
- ✓ Stakeholders engagement

## 3. ENACT ENERGY AUDITOR TRAINING PROGRAM

According to the professional profile in terms of activities and KSC schema, an **80 hours** ENACT training course is foreseen. The table below shows the synthetic representation of the ENACT training program, in terms of:

- **learning outcomes structure**, articulation and timing;
- training **methodology** and **assessment** criteria;
- **ECVET points**. A total of **6 ECVET points** have been allocated to the ENACT course (80 hours). The ECVET points have been allocated to the course modules according to a multiple ponderation schema, taking into consideration **3 aspects**: duration of the module (in terms of number of hours), assessment and training methodology and level of difficulty.

Module	Hours	Methodology	Assessment Methodology	Ecvet
<b>1. Introduction to energy auditing in residential sector</b>	12	On line resources - Lesson (on line or in presence) - Tutor on line	Multiple choice (10 questions)	0,5
<b>2. Legislation, regulations and contracts in residential sector</b>	5	On line resources - Lesson (on line or in presence) - Tutor on line	Multiple choice (10 questions)	0,5
<b>3. Building envelope</b>	9	On line resources - Lesson (on line or in presence) - Exercises/simulations/lab - - Tutor on line	Multiple choice (10 questions)	0,5
<b>4. Heating, ventilation, air conditioning and hot water systems in residential sector</b>	8	On line resources - Lesson (on line or in presence) - Exercises/simulations/lab - - Tutor on line	Multiple choice (10 questions)	0,5
<b>5. Lighting systems, domestic appliances and other energy consuming devices in residential sector</b>	7	On line resources - Lesson (on line or in presence) - Exercises/simulations/lab - - Tutor on line	Multiple choice (10 questions)	0,5
<b>6. Energy production from renewable energy sources in residential sector</b>	10	On line resources - Lesson (on line or in presence) - Tutor on line	Multiple choice (10 questions)	0,5
<b>7. Economic assessment</b>	6	On line resources - Lesson (on line or in presence) Simulations - Tutor on line	Multiple choice (10 questions)	0,5
<b>8. Energy audit methodology</b>	13	On line resources - Guided simulations, exercises, project work - Tutor on line	Multiple choice (10 questions) and/or Case studies	1,5
<b>9. Project management</b>	4	On line resources - Lesson (on line or in presence) - Tutor on line	Multiple choice (10 questions)	0,5
<b>10. Communication and marketing</b>	6	On line resources - Lesson (on line or in presence) - Tutor on line Lesson - Tutor on line	Multiple choice (10 questions)	0,5
	<b>80</b>			<b>6</b>

The following two tables give respectively:

1. a short description of the content of the modules;
2. a short description of learning units and time allocated

Module	Description
<b>1. Introduction to energy auditing in residential sector</b>	The module aims at providing the general information to conduct an energy audit (data collection, field work, analysis) and guidance on how to carry out energy audits in accordance to the European standard 16247.
<b>2. Legislation, regulations and contracts in residential sector</b>	The module provides an overview of relevant European and national legislation, regulations and contracts applicable to energy audit
<b>3. Building envelope</b>	The module describes the most common information about building envelope (walls, roofs, doors, windows ...) and includes information and calculation of energy efficient interventions applicable to the different building elements.
<b>4. Heating, ventilation, air conditioning and hot water systems in residential sector</b>	The module contains technical information on heating, ventilation, air conditioning and hot water systems. It also includes a series of interventions and calculation for improving the energy performance of the systems
<b>5. Lighting systems, domestic appliances and other energy consuming devices in residential sector</b>	The module informs about technical data especially on energy aspects of lighting systems, domestic appliances and other energy consuming devices in residential sector. It includes interventions to improve the efficiency of the lighting system and to monitor the energy consumption of domestic appliances.
<b>6. Energy production from renewable energy sources in residential sector</b>	The module presents technological solutions to produce clean and renewable energy for the building. It includes the most used energy renewable sources in residential sector: photovoltaic, solar thermal, heat pump and biomass and the way to integrate them.
<b>7. Economic assessment</b>	The module presents economic assessment of energy efficiency improvements considering energy savings, funding opportunities, investment costs.
<b>8. Energy audit methodology</b>	The aim of the module is to acquire the methodology to manage residential building energy audit, through the presentation of different case studies and practical application.
<b>9. Project management</b>	The module aims to manage the complete energy audit process from the planning to the development of energy efficiency improvements, ending with monitoring the energy efficiency results and documenting energy audit findings.
<b>10. Communication and marketing</b>	The module aims to provide information concerning principles of communication and communication techniques for energy auditors to be able to communicate with technical and not-technical people at various levels on all aspects concerning technical and economical aspects of the energy audit.

Module	LEARNING UNIT	h	Description
<b>1. Introduction to energy auditing in residential sector</b>	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.
	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.
	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.
	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.
	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 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	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.
	7	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.
	8	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.
	9	1	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.
		12	
<b>2. Legislation, regulations and contracts in residential sector</b>	1	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.
	2	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.	
	3	European and National standards	1	<p>The Unit aims to provide information on the European and National standards, that can be useful to carry out an energy audit.</p> <p>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.</p>
			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.).
	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.
	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.
			9	
4. Heating, ventilation, air conditioning and hot water systems in residential sector	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 performance in terms of energy efficiency.
	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.
	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.
			8	
5. Lighting systems, domestic appliances and other energy consuming devices in residential sector		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
	4	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.
		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.
		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
			7	
6. Energy production from renewable energy sources in	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.
	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.

<b>residential sector</b>	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
	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
	5	Procedures for integrating renewable energy systems	2	The Unit aims to provide basilar information on integration of renewable energy systems, including hybrid solutions.
			10	
<b>7. Economic assessment</b>	1	Financing and subsidies	2	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.
	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.
		Total	6	
<b>8. Energy audit methodology</b>	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.
	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. I also aims to show and practice methodology of preparing energy audit overview (case studies).
	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.
			13	
<b>9. Project management</b>	1	Basics of project management	4	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.
			4	
<b>10. Communication and marketing</b>	1	Communication techniques concerning energy audits	3	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.
	2	Presentation of results and reporting	3	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.
			6	



## 4. ANNEX A- PROGRAM IN ENGLISH

MODULE	LEARNING UNITS	HOURS	ECVET points
1. INTRODUCTION TO ENERGY AUDITING IN RESIDENTIAL SECTOR	ENERGY UNITS, ENERGY SOURCES, UNIT CONVERSION FACTORS	1	0,5
	PRINCIPLES OF BUILDING PHYSIC AND THERMODYNAMIC	1	
	ENERGY AUDITING PROCESS	2	
	TASKS AND FUNCTIONS OF A RESIDENTIAL ENERGY AUDITOR	1	
	GENERAL FEATURES OF THE ENERGY MARKET	2	
	CHARGES AND TARIFF STRUCTURING	1	
	DATA ANALYSIS	2	
	DEVELOPING A BUILDING ENERGY BALANCE	1	
	ENERGY PERFORMANCE INDICATORS	1	
2. LEGISLATION, REGULATIONS AND CONTRACTS IN RESIDENTIAL SECTOR	REGULATIONS FOR PROCUREMENT, WORKING AND ENERGY SUPPLY CONTRACTS	2	0,5
	EUROPEAN AND NATIONAL LEGISLATION CONCERNING ENERGY EFFICIENCY,	2	
	EUROPEAN AND NATIONAL STANDARDS	1	
3. BUILDING ENVELOPE	GENERAL INFORMATION ON THE BUILDING MARKET AND CONSTRUCTION	2	0,5
	BUILDING EVALUATION IN TERMS OF: WINDOWS, ROOFS, DOORS, WALLS, AIR	3	
	TECHNIQUES, TOOLS AND CALCULATION TO IMPROVE ENERGY EFFICIENCY	4	
4. HEATING VENTILATION AIR CONDITIONING HOT WATER SYSTEMS IN RESIDENTIAL	BUILDING SYSTEMS EVALUTATON	2	0,5
	TECHNIQUES AND TOOLS TO IMPROVE ENERGY EFFICIENCY IN THE RESIDENTIAL SECTOR	3	
	CALCULATION OF ENERGY SAVINGS AND ENERGY EFFICIENCY MODERNIZATIONS	3	
5. LIGHTING SYSTEMS DOMESTIC APPLIANCES AND OTHER ENERGY CONSUMING DEVICES	BASICS OF LIGHTING AND CURRENT LIGHTING TECHNOLOGIES	1	0,5
	EFFICIENT ARTIFICIAL LIGHTING SYSTEMS, OPTIMIZATION AND CONTROLLING LIGHTIN	2	
	ECONOMIC EVALUATION OF LIGHTING IMPROVEMENTS	2	
	DOMESTIC APPLIANCES AND OTHER ENERGY CONSUMING DEVICES	2	
6. ENERGY PRODUCTION FROM RENEWABLE ENERGY SOURCES IN RESIDENTIAL SECTOR	PV SYSTEMS	2	0,5
	SOLAR THERMAL SYSTEMS	2	
	HEAT PUMPS	2	
	BIOMASS (SOLID BIOFUELS)	2	
	PROCEDURES FOR INTEGRATING RENEWABLE ENERGY SYSTEMS	2	
7. ECONOMIC ASSESSMENT	FINANCING AND SUBSIDIES	2	0,5
	ECONOMIC ASSESSMENT	4	
8. ENERGY AUDIT METHODOLOGY	MEASURING TECHNOLOGIES AND METERING EQUIPMENT	3	1,5
	GOOD PRACTICES AND CASE STUDIES	6	
	MONITORING, CONTROL AND ADJUSTMENT OF ENERGY CONSUMPTION PARAMETERS	4	
9. PROJECT MANAGEMENT	BASICS OF PROJECT MANAGEMENT	4	0,5
10. COMMUNICATION AND MARKETING	COMMUNICATION TECHNIQUES CONCERNING ENERGY AUDITS	3	0,5
	PRESENTATION OF RESULTS AND REPORTING	3	
		<b>80</b>	

## 5. ANNEX B- PROGRAM IN ITALIAN

MODULI	UNITA'	ORE	ECVET
<b>1. Introduzione all'energy audit nel settore residenziale</b>	Unità energetiche; fonti energetiche; fattori di conversione	1	<b>0,5</b>
	Principi di fisica e di termodinamica per gli edifici	1	
	Il processo di audit energetico	2	
	Compiti e funzioni dell'energy auditor nel settore residenziale	1	
	Caratteristiche generali del mercato elettrico	2	
	Oneri e strutturazione delle tariffe energetiche	1	
	Data analysis (analisi dati)	2	
	Sviluppare un bilancio energetico dell'edificio	1	
	Indicatori di performance energetica	1	
<b>2. Legislazione, normativa e contratti nel settore residenziale</b>	Regolamentazioni e procedure per appalti, gare, contratti di lavori, contratti di fornitura di energia - strumenti finanziari	2	<b>0,5</b>
	Legislazione nazionale e europea per l'efficienza energetica e per le rinnovabili	2	
	Normativa tecnica nazionale ed europea	1	
<b>3. Involucro edilizio</b>	Il quadro del settore edilizio esistente e i principali materiali e tecniche utilizzate	2	<b>0,5</b>
	La valutazione dell'edificio: finestre, tetti, porte, mura, ricambi d'aria	3	
	Tecniche, strumenti e calcolo del miglioramento della performance energetica	4	
<b>4. Riscaldamento, Ventilazione, raffrescamento ed acqua calda nel settore residenziale</b>	Valutazione degli impianti tecnologici dell'edificio	2	<b>0,5</b>
	Tecniche e strumenti per migliorare la performance energetica degli impianti tecnologici nel settore residenziale	3	
	Calcolo del risparmio energetico e/o del miglioramento dell'efficienza energetica	3	
<b>5. Sistemi di illuminazione, elettrodomestici ed altri dispositivi elettronici nel settore residenziale</b>	Fondamenti e di illuminotecnica	1	<b>0,5</b>
	Sistemi efficienti di illuminazione artificiale, sistemi di controllo e ottimizzazione dell'illuminazione	2	
	Valutazione economica del miglioramento energetico nell'illuminazione	2	
	Elettrodomestici ed altri dispositivi elettrici	2	
<b>6. Fonti energetiche rinnovabili nel settore residenziale</b>	Fotovoltaico	2	<b>0,5</b>
	Solare termico	2	
	Pompe di calore	2	
	Biomassa	2	
	Tecniche per sistemi integrati con fonti rinnovabili	2	
<b>7. Valutazione economica</b>	Incentivi e fondi	2	<b>0,5</b>
	Valutazione economico finanziaria	4	
<b>8. Metodologie per l'energy audit</b>	Strumenti di misura e monitoraggio	3	<b>1,5</b>
	Buone pratiche e casi studio	6	
	Monitoraggio, controllo e regolazione dei parametri di consumo energetici	4	
<b>9. Project management</b>	Fondamenti di project management	4	<b>0,5</b>
<b>10. Comunicazione e marketing</b>	Tecniche e modelli di comunicazione per l'audit energetico	3	<b>0,5</b>
	Presentazione documentale dei risultati	3	
		<b>80</b>	

## 6. ANNEX C- PROGRAM IN POLISH

MODUŁ	ROZDZIAŁ	LIŚĆ GODZ	PUNKT Y ECVE
1. WPROWADZENIE DO AUDYTU ENERGETYCZNEGO	ZRÓDŁA ENERGII, JEDNOSTKI ENERGETYCZNE	1	0,5
	PODSTAWY FIZYKI BUDOWLI I TERMODYNAMIKI	1	
	PROCES PRZEPROWADZANIA AUDYTU ENERGETYCZNEGO	2	
	ZADANIA I FUNKCJE AUDYTORA ENERGETYCZNEGO W SEKTORZE MIESZKANIOWYM	1	
	OGÓLNA CHARAKTERYSTYKA RYNKU ENERGII	2	
	RODZAJE OPŁAT I TARYF	1	
	ANALIZA DANYCH	2	
	SPORZĄDZENIE BILANSU ENERGETYCZNEGO BUDYNKU	1	
	WSKAŹNIKI CHARAKTERYSTYKI ENERGETYCZNEJ	1	
2. LEGISLACJA, REGULACJE I UMOWY W SEKTORZE MIESZKANIOWYM	PRZEPISY I PROCEDURY DOTYCZĄCE ZAMÓWIEŃ, OFERT, UMÓW NA USŁUGI ENERGETYCZNE	2	0,5
	EUROPEJSKIE I KRAJOWE AKTY PRAWNE W OBSZARZE EFEKTYWNOŚCI ENERGETYCZNEJ I OZE	2	
	EUROPEJSKIE I KRAJOWE NORMY	1	
3. OBUDOWA ZEWNĘTRZNA BUDYNKU	PODSTAWOWE INFORMACJE O RYNKU BUDOWLANYM I GŁÓWNYCH ETAPACH PROCESU BUDOWALNEGO	2	0,5
	OCENA BUDYNKU POD KĄTEM OKIEN, DACHU, DRZWI, ŚCIAN, CYRKULACJI POWIETRZA	3	
	POPRAWA EFEKTYWNOŚCI ENERGETYCZNEJ BUDYNKU: TECHNOLOGIE, NARZĘDZIA I KALKULACJE	4	
4. OGRZEWANIE, WENTYLACJA, KLIMATYZACJA, CHŁODZENIE ORAZ INSTALACJE CIEPŁEJ WODY UŻYTKOWEJ	OCENA SYSTEMÓW BUDYNKU	2	0,5
	POPRAWA EFEKTYWNOŚCI ENERGETYCZNEJ SYSTEMÓW BUDYNKU	3	
	KALKULACJA OSZCZĘDNOŚCI ENERGII I/LUB PRZEDSIĘWZIĘĆ POPRAWY EFEKTYWNOŚCI ENERGETYCZNEJ	3	
5. SYSTEMY OŚWIETLENIA I URZĄDZENIA GOSPODARSTWA DOMOWEGO W BUDYNKACH MIESZKALNYCH	PODSTAWY OŚWIETLENIA I OBECNE TECHNOLOGIE OŚWIETLENIOWE, W TYM SYSTEMY ZARZĄDZANIA	1	0,5
	WYDAJNE SYSTEMY SZTUCZNEGO OŚWIETLENIA, OPTIMALIZACJA NATURALNEGO ŚWIATŁA	2	
	OCENA EKONOMICZNA PRZEDSIĘWZIĘĆ POPRAWY OŚWIETLENIA	2	
	ENERGOOSZCZĘDNE URZĄDZENIA GOSPODARSTWA DOMOWEGO	2	
6. PRODUKCJA ENERGII ZE ŹRÓDEŁ ODNAWIALNYCH W SEKTORZE MIESZKANIOWYM	SYSTEMY FOTOWOLTAICZNE	2	0,5
	SYSTEMY SOLARNE	2	
	POMPY CIEPŁA	2	
	BIOMASA (BIOPALIWA STAŁE)	2	
	INTEGRACJA INSTALACJI SYSTEMÓW ENERGETYKI ODNAWIALNEJ	2	
7. OCENA EKONOMICZNA	MOŻLIWOŚCI FINANSOWANIA I DOTACJI	2	0,5
	OCENA EKONOMICZNA	4	
8. METODOLOGIA PRZEPROWADZANIA AUDYTU ENERGETYCZNEGO	URZĄDZENIA I TECHNIKI POMIAROWE	3	1,5
	DOBRE PRZYKŁADY I PRAKTYCZNE ROZWIĄZANIA	6	
	MONITORING, KONTROLA I REGULACJA PARAMETRÓW ZUŻYCIA ENERGII	4	
9. PROJECT MANAGEMENT	PODSTAWY ZARZĄDZANIA PROJEKTEM	4	0,5
10. KOMUNIKACJA I MARKETING	TECHNIKI KOMUNIKACYJNE NA POTRZEBY AUDYTU	3	0,5
	PREZENTACJA WYNIKÓW I RAPORTOWANIE	3	
		<b>80</b>	

## 7. ANNEX D- PROGRAM IN PORTUGUESE

MÓDULO	UNIDADES DE APRENDIZAGEM	HORAS	Créditos
1. INTRODUÇÃO A AUDITORIA ENERGÉTICA NO SETOR RESIDENCIAL	UNIDADES DE ENERGIA, FONTES DE ENERGIA, FATORES DE CONVERSÃO	1	0,5
	PRINCÍPIOS DE FÍSICA DAS CONSTRUÇÕES E DE TERMODINÂMICA	1	
	PROCESSO DE AUDITORIAS ENERGÉTICAS	2	
	TAREFAS E FUNÇÕES DO AUDITOR DE ENERGIA NO SETOR RESIDENCIAL	1	
	CARACTERÍSTICAS GERAIS DO MERCADO DE ENERGIA	2	
	ESTRUTURA TARIFÁRIA	1	
	ANÁLISE DE DADOS	2	
	CÁLCULO DO BALANÇO ENERGÉTICO	1	
	INDICADORES DE EFICIÊNCIA ENERGÉTICA	1	
2. LEGISLAÇÃO, REGULAMENTOS E CONTRATOS NO SETOR RESIDENCIAL	REGULAMENTOS E PROCEDIMENTOS DE PROCUREMENT, CONCURSOS E LEGISLAÇÃO EUROPEIA E NACIONAL SOBRE EFICIÊNCIA ENERGÉTICA E ENERGIAS	2	0,5
	NORMAS EUROPEIAS E NACIONAIS	2	
		1	
3. ENVOLVENTE DO EDÍFICIO	INFORMAÇÃO GERAL SOBRE O MERCADO IMOBILIÁRIO E O PROCESSO DE ANÁLISE DA ENVOLVENTE DO EDIFÍCIO: JANELAS, PORTAS, COBERTURAS, TÉCNICAS, FERRAMENTAS E CÁLCULOS PARA A MELHORIA DA EFICIÊNCIA	2	0,5
		3	
		4	
4. SISTEMAS DE AQUECIMENTO, VENTILAÇÃO E AR CONDICIONADO E DE AQUECIMENTO DE ÁGUAS QUENTES SANITÁRIAS NO SETOR RESIDENCIAL	AVALIAÇÃO DOS SISTEMAS DOS EDIFÍCIOS	2	0,5
	TÉCNICAS, FERRAMENTAS E CÁLCULOS PARA A MELHORIA DA EFICIÊNCIA ENERGÉTICA NO SETOR RESIDENCIAL	3	
	CÁLCULO DAS ECONOMIAS DE ENERGIA E IDENTIFICAÇÃO DE MEDIDAS DE	3	
5. SISTEMAS DE ILUMINAÇÃO E OUTROS EQUIPAMENTOS CONSUMIDORES DE ENERGIA	INTRODUÇÃO À ILUMINAÇÃO - CONCEITOS E TECNOLOGIAS	1	0,5
	SISTEMAS DE ILUMINAÇÃO EFICIENTES E DE OTIMIZAÇÃO E CONTROLO DA ILUMINAÇÃO	2	
	AVALIAÇÃO ECONÓMICA DE MEDIDAS DE MELHORIA DA ILUMINAÇÃO	2	
	ELETRDOMÉSTICOS E OUTROS EQUIPAMENTOS CONSUMIDORES DE ENERGIA	2	
6. PRODUÇÃO DE ENERGIA A PARTIR DE RENOVÁVEIS NO SETOR RESIDENCIAL	SISTEMAS SOLARES FOTOVOLTAICOS	2	0,5
	SISTEMAS SOLARES TÉRMICOS	2	
	BOMBAS DE CALOR	2	
	BIOMASSA (COMBUSTÍVEIS SÓLIDOS)	2	
	PROCEDIMENTOS PARA A INTEGRAÇÃO DE ENERGIAS RENOVÁVEIS	2	
7. AVALIAÇÃO ECONÓMICA	FINANCIAMENTO E SUBSÍDIOS	2	0,5
	AVALIAÇÃO ECONÓMICA	4	
8. METODOLOGIA PARA AS AUDITORIAS ENERGÉTICAS	TECNOLOGIAS E EQUIPAMENTOS DE MEDIÇÃO	3	1,5
	BOAS PRÁTICAS E CASOS PRÁTICOS	6	
	MONITORIZAÇÃO, CONTROLO E AJUSTE DOS PARÂMETROS DE CONSUMO DE ENERGIA	4	
9. GESTÃO DE PROJETO	PRINCÍPIOS DE GESTÃO DE PROJETO	4	0,5
10. COMUNICAÇÃO E MARKETING	TÉCNICAS DE COMUNICAÇÃO DE AUDITORIAS ENERGÉTICAS	3	0,5
	APRESENTAÇÃO DE RESULTADOS E ELABORAÇÃO DE RELATÓRIOS	3	
		<b>80</b>	

## 8. ANNEX E- PROGRAM IN SPANISH

MÓDULO	UNIDADES DIDÁCTICAS	NUMERO DE HORAS	PUNTOS ECYET
1. INTRODUCCIÓN A LA AUDITORÍA ENERGÉTICA EN EDIFICIOS RESIDENCIALES	UNIDADES DE ENERGÍA, FUENTES DE ENERGÍA Y FACTORES DE CONVERSIÓN	1	0,5
	PRINCIPIOS FÍSICOS Y TERMODINÁMICAS DE LA CONSTRUCCIÓN	1	
	PROCESO DE LA AUDITORÍA ENERGÉTICA	2	
	TAREAS Y FUNCIONES DE UN AUDITOR ENERGÉTICO RESIDENCIAL	1	
	CARACTERÍSTICAS GENERALES DEL MERCADO DE LA ENERGÍA	2	
	ESTRUCTURACIÓN DE TARIFAS	1	
	ANÁLISIS DE DATOS	2	
	DESARROLLO DEL BALANCE ENERGÉTICO DEL EDIFICIO	1	
	INDICADORES DE RENDIMIENTO ENERGÉTICO	1	
2. LEGISLACIÓN, REGULACIÓN Y CONTRATOS EN EL SECTOR RESIDENCIAL	LOS CONTRATOS DE SUMINISTRO ENERGÉTICO Y SU REGULACIÓN	2	0,5
	LEGISLACIÓN NACIONAL Y EUROPEA SOBRE EFICIENCIA ENERGÉTICA Y	2	
	NORMAS NACIONALES Y EUROPEAS	1	
3. ENVOLVENTE DEL EDIFICIO	INFORMACIÓN GENERAL SOBRE EL MERCADO DE LA CONSTRUCCIÓN	2	0,5
	EVALUACIÓN DE LA CONSTRUCCIÓN: VENTANAS, TECHOS, PUERTAS Y PAREDES	3	
	TÉCNICAS, HERRAMIENTAS Y CÁLCULOS PARA LA MEJORA EN LA EFICIENCIA	4	
4. CALEFACCIÓN, VENTILACIÓN, AIRE ACONDICIONADO Y AGUA CALIENTE SANITARIA	EVALUACIÓN DE SISTEMAS CONSTRUCTIVOS	2	0,5
	TÉCNICAS Y HERRAMIENTAS PARA MEJORAR LA EFICIENCIA ENERGÉTICA	3	
	CÁLCULO DEL AHORRO ENERGÉTICO	3	
5. LOS SISTEMAS DE ILUMINACIÓN DE USO DOMÉSTICO Y OTROS DISPOSITIVOS	CONCEPTOS BÁSICOS DE ILUMINACIÓN Y TECNOLOGÍAS DE ILUMINACIÓN	1	0,5
	LOS SISTEMAS EFICIENTES DE ILUMINACIÓN ARTIFICIAL, OPTIMIZACIÓN Y CONTROL	2	
	LA EVALUACIÓN ECONÓMICA EN LAS MEJORAS DE ILUMINACIÓN	2	
	ELECTRODOMÉSTICOS Y OTROS APARATOS QUE CONSUMEN ENERGÍA	2	
6. LAS ENERGÍAS RENOVABLES EN EL SECTOR RESIDENCIAL	SISTEMA FOTOVOLTAICO	2	0,5
	SISTEMA TERMOSOLAR	2	
	BOMBAS DE CALOR	2	
	BIOMASA	2	
	PROCEDIMIENTOS PARA LA INTEGRACIÓN DE ENERGÍAS RENOVABLES	2	
7. LA EVALUACIÓN ECONÓMICA	FINANCIACIÓN Y AYUDAS	2	0,5
	EVALUACIÓN ECONÓMICA	4	
8. METODOLOGÍA DE LAS AUDITORÍAS ENERGÉTICAS	TECNOLOGÍAS DE MEDICIÓN Y EQUIPOS DE MEDIDA	3	1,5
	BUENAS PRÁCTICAS Y EJEMPLOS	6	
	MONITORIZACIÓN, CONTROL Y AJUSTE DE PARÁMETROS DE LOS CONSUMOS DE ENERGÍA	4	
9. GESTIÓN DE PROYECTOS	GESTIÓN DE PROYECTOS	4	0,5
10. COMUNICACIÓN Y MARKETING	TÉCNICAS DE COMUNICACIÓN PARA LOS AUDITORES ENERGÉTICOS	3	0,5
	PRESENTACIÓN DE INFORMES Y RESULTADOS	3	
		<b>80</b>	