

ENACT NATIONAL AND EUROPEAN PROFILES

VALIDATION

1 ENACT (Energy Auditors Competencies, training and profiles) project

Starting on the 1st of September 2014 and lasting for 24 months, ENACT is a European initiative 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 EU based qualification system for energy auditors and the integration and development of open educational resources and definition of training resources** - the activities to be developed within the 24-month project period include:

- **Analysis of the training programmes** and qualification frames in the participating 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 “**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** (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 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

2 ENACT Validation

The validation activity in ENACT is carried out in strong collaboration with the National stakeholders in order to collect their input and feedback to:

- ✓ reinforce the embeddedness of ENACT profile, curricula and ECVET based programs within the regional / national qualification frames;
- ✓ guarantee the energy auditors professional recognition, employability and (regional, national, EU) mobility;
- ✓ assure the sustainability, in terms of professional profile validation and dynamic development.

3 “ENACT National and European profiles validation” overview

The present document represents the guideline for the stakeholders in order to provide them with the necessary information and templates for the validation activity of the:

- ✓ **ENACT Energy auditor professional profile** (activities and competences) and/or
- ✓ **ENACT curriculum and training program** and/or
- ✓ **ENACT learning resources**.

To carry out the validation, the ENACT team has prepared (annexed to this document) the following input:

- ✓ ENACT Energy Auditor profile (descriptive scheme as reported in Annex 1),
- ✓ ENACT Energy Auditor Training program (including the entry criteria, evaluation methodology of the entry criteria, ECVET scheme, detailed training programme), as reported in Annex 2,
- ✓ Validation checklist (Annex 3).

The ENACT team thanks you for your precious collaboration in analysing the above mentioned documents and providing us with your feedback through the validation checklist.

4 ANNEXES

ANNEX 1 - ENACT Energy Auditor profile

ANNEX 2 - ENACT Energy Auditor Training program (including entry criteria, evaluation methodology, ECVET scheme, learning resources).

ANNEX 3 - Validation checklist

4.1 ANNEX 1 - ENACT Energy Auditor profile

ENACT Energy Auditor is a professional figure to carry out energy audits for the residential sector.

The *ENACT Energy Auditor* covers all the process of the energy audit of households, from the collection of data to the field work, from the data analysis to the relationship with the client. It's important to underline that the *ENACT Energy Auditor*, in addition to the identification of energy improvement measures, also implements the measures and monitors the achieved improvements in terms of energy consumption reduction. This is the main added value of the ENACT energy auditor in comparison with the profile defined by EN 16247.

The ENACT professional profile has been developed taking into consideration the National and, where relevant, Regional qualification frameworks of each partner countries (Italy, Poland, Portugal and Spain), the European standard EN 16247, the Italian Standard UNI CEI 13339 concerning the energy management expert, the Italian regional repertories with reference to the qualifications related to the buildings energy auditing.

The Enact professional profile has been articulated in four main areas - Management, Auditing, Planning, Implementing/Monitoring, each articulated in terms of activities. The table below illustrated the activities carried out by the *ENACT Energy Auditor* for each of the four identified areas:

AREA	ACTIVITIES
1. Management <i>(vertical and transversal dimensions)</i>	1.1. Planning the energy audit in terms of scope, resources and time schedule/management 1.2. Coordination 1.3. Conflicts management 1.4. Communication and reporting
2. Auditing	1.5. Collection of energy historical consumptions and collection of information about external conditions 1.6. Diagnosis of energy context 1.7. Representation of the energy situation of the integrated building system 1.8. Comparison with technical performance indicators 1.9. Preliminary identification of energy efficiency measures and the use of renewable energy
3. Planning	1.10. Definition of the measures to improve the integrated energy performance 1.11. Set up the technical solutions for the integrated energy performance improvement 1.12. Economic assessment of the energy efficiency improvement opportunities proposed 1.13. Elaboration of energy saving plans 1.14. Design of energy saving systems 1.15. Re-contracting energy supply
4. Implementing/ Monitoring	1.16. Implement the selected EE measures 1.17. Monitor the energy consumptions 1.18. Support and supervision

Consistently with the project aims and approach, the professional profile has then been built by defining, per each activity, the required knowledge, skills and competences.

Following the synthetic representation of the overall ENACT profile, representing the main conceptual and operative frame for qualification referentiation and comparison as well as for defining training standards and systems (Annex 2).

Activities Area	Specific Activities	Knowledge	Skills	Competences
Management	Planning the energy audit in terms of scope, resources and time schedule	Knowledge of verbal and physical communication methodologies	project management and methodology skills	Competence in energy matters, project management , communication and reporting
		basic knowledge of management and budget control and project management		Competence in energy audit, including the identification of energy efficiency measures and the use of renewable energy, the financial assessment and risk evaluation
	Coordination	basic knowledge of reporting, communication and marketing	Organisational and leadership skills	
	Managing conflicts		Communication (including moderation and reporting) and interpersonal skills	Competence in energy management planning
	Communication and reporting	Knowledge of "traditional" and renewable energies		
Auditing	Collection of energy historical consumptions and collection of	Knowledge of laws, policies, rules, regulations and standards in energy field	Be able to apply energy audit principles and methodology be able to quantify energy consumptions and uses	Competence in doing all the necessary steps for the measures implementation

	information about external conditions	Knowledge of residential sector components and materials Knowledge of physical principles related to energy Knowledge of energy audit principles and methodology Knowledge of technical tools / metering and measuring equipment to conduct an audit or data registry	Be able to manage the complete energy audit process; be capable of making a measuring/metering plan for the data collecting activities; be able to identify and manage the equipment necessary to conduct the energy audit; be able to verify and validate the measurements of all data and test results and to draw conclusions	Competence in application of relevant laws, regulations, standards, policies, incentives
	Diagnosis of energy context Representation of the energy situation of the integrated building system			
	Comparison with technical performance indicators			
	Preliminary identification of energy efficiency measures and the use of renewable energy			
Planning	Definition of the measures to improve the integrated energy performance Set up the technical solutions for the integrated energy performance improvement Economic	Knowledge of economic evaluation methods of projects, of the profitability of investments, financing sources, financing tools and assessment of project risks. Knowledge of assessment techniques of achievable/ achieved energy savings	Skills to evaluate the energy efficiency improvement opportunities (i.e. LCCA, payback period, rate of return of the investment; discounted cash flow, net present value)	

	assessment of the energy efficiency improvement opportunities proposed			
	Elaboration of energy saving plans			
	Design of energy saving systems		Skills to recommend energy efficiency improvement opportunities and possible different solutions for implementation	
	Recontracting energy supply	Knowledge of the market for electricity and gas and the actors involved. Knowledge of the energy supply, contractual forms and energy current tariffs		
Implementation and Monitoring	Implement the selected EE measures	Knowledge of the applications to act on monitoring systems and data collection Knowledge on the interpretation of results according to the logical, real and proposed consumption		
	Monitor the energy consumptions		Be able to propose an action plan to monitor the energy performance	
	Support and supervision			

4.2 ANNEX 2 - ENACT Energy Auditor training program

According to the professional profile defined in terms of activities and KSC schema, an 80-hour ENACT training course has been built. The table below shows the synthetic representation of the ENACT training program and learning outcomes structure, articulation and timing, as well as the:

- training methodology
- assessment criteria
- resources implemented in the technology enhanced learning ENACT system
- ECVET points.

Module	Hours	Methodology	Assessment Methodology	Ecvet
1. Introduction to energy auditing	12	On line resources fruition Lesson (on line or in presence) Simulation/Lab - Tutor on line	multiple choice (10 questions)	0,5
2. Building envelope	8	On line resources - <i>Exercise/ Lab - Tutor on line</i>	multiple choice (10 questions)	0,5
3. Heating, conditioning and hot water systems	8	On line resources - Lesson- <i>Exercise/ Lab - Tutor on line</i>	multiple choice (10 questions)	0,5
4. Lighting systems, domestic appliances and office equipment	7	On line resources - <i>Exercise/ Lab - Tutor on line</i>	multiple choice (10 questions)	0,5
5. Energy production from renewables	10	On line resources - <i>Tutor on line</i>	multiple choice (10 questions)	0,5
6. Financial calculation and incentives/ fundings	6	On line resources - Lesson- <i>Exercise/ Lab - Tutor on line</i>	multiple choice (10 questions)	0,5
7. Energy audit applicative methodology	13	On line resources fruition Lesson (on line or in presence) Project work - Tutor on line	2 case studies	1,5
8. Project management	5	On line resources fruition Lesson - Tutor on line	multiple choice (5 questions)	0,5
9. Communication and marketing	6	On line resources fruition Lesson - Tutor on line	multiple choice (5 questions)	0,5
10. Legislation, regulations and contracts	5	On line resources fruition Lesson - Tutor on line	multiple choice (5 questions)	0,5

The training program entry level foresees:

- Technical degree/ diploma;
- Work experience in the energy efficiency sector (namely in the field of energy audit and consulting)

The table below show the country base entry level.

	Education	Specific working (years)
Italy	Technical degree/ diploma	
	Other degree/ diploma	2
Poland	Degree on engineering or architecture recognized by the respective professional association	
	Other degree	1
Portugal	Degree on engineering or architecture recognized by the respective professional association	
	Other degree	1
Spain	Technical degree	
		2 + professional modules in energy efficiency
		3 + knowledge in an initial test

ENACT TRAINING PROGRAM

Module	Learning Outcomes	Contents	Hours	Training methodology				Assessment Methodology	Ecvet
				On line resources fruition	Lesson (on line or in presence)	Simulation /Lab/ project work	Tutor on line		
1. Introduction to energy auditing	Energy units; energy sources; conversion factors	Energy sources (i.e. fossil, renewable energy) and carriers (electricity, steam...), greenhouse gas emissions	1	x			Asynchroniuos availability for doubts, informations,	multiple choice (10 questions)	0,5
	Principles of physic and thermodynamic	Fundamentals of energy (generation and trasmission of heat; electricity generation and trasmission; lighting)	1	x					
	Energy auditing process	Description of the energy audit process on the basis of the standard EN 16247/1 (general requirements)	2		x				

		and EN 16247/2 (building)					
	Tasks and functions of residential energy auditor		1		x		
	General features of the energy market	Actors involved (i.e. EM, EA, ESCO, energy suppliers, ...)	2	x	x		
	Bills Tariff and tariff structures	Evolution of energy prices; kind and composition of tariff	1	x	x	Indiv and collaborativ e exercise -	Assignment and giving feedbacks (videoconf and/or emails)
	Data analysis	i.e. Collect historical energy consumption and driver data (wheather; Building occupancy,...) and data analysis	2	x	x		
	Developing energy balance	how to develop an energy balance	1	x	x		

	Energy performance indicators	Evaluating theoretical energy performance indicators; Evaluating actual energy performance indicators; benchmarks	1	x	X				
2. Building envelope	General information on building market and on the main elements of the construction process	Specific considerations related to different kinds of buildings (hystorical buildings, new buildings; existing buildings undergoing major refurbishments; passive house)	2	x			Asynchronius availability for doubts, informations, ...	multiple choice (10 questions)	0,5
	Evaluating the building in terms of: windows, roofs, doors, walls, air changes	Materials, components and building envelope system; energy characterization of opaque and transparent envelope elements	2	x					
	techniques and tools to improve energy efficiency in the residential	i.e. different type and level of insulation; airtightness; shading devices; building	2	x					

	sector	automation							
	calculation of energy savings and/or energy efficient improvements	Evaluating theoretical energy saving and efficiency considering the improvement of building envelope	2	x		Exercise	Assignment and giving feedbacks (videoconf and/or emails)		
3.Heating, conditioning and hot water systems	Evaluating the building systems (i.e. gas boiler, heat pump, district, central or individual heating system, heat distribution, hot water systems, forced air/ radiant heat/ radiator)	Specific knowledge about different systems in terms of energy efficiency and other technical data	3	x			Asynchroniuos availability for doubts, informations,	multiple choice (10 questions)	0.5

	techniques and tools to improve energy efficiency in the residential sector	i.e. CHP (combined heat and power generation); condensing boilers; Heat recovery in HVAC (heating, ventilation, and air-conditioning) systems; Building energy management systems (BEMS) including Control systems and energy regulation in building/ facilities/ systems; district heating	3	x					
	calculation of energy savings and/or energy efficient improvements		2	x	1	Exercise	Assignment and giving feedbacks (videoconf and/or emails)		
4. Lighting systems, domestic appliances and office	Type of technology	Basics of lighting and current lighting technologies, including management systems	2	x				multiple choice (10 questions)	0,5

equipment		Efficient artificial lighting systems, optimization of natural light	1	x		Exercise	Assignment and giving feedbacks (videoconf and/or emails)		
		Economic evaluation of example lighting improvements	2	x			Asynchronous availability for doubts, informations,		
		Energy efficient appliances	2	x					
5. Energy production from renewables	techniques and tools to improve development of renewables in the residential sector	Solar Electric PV	2	x			Assignment and giving feedbacks (videoconf and/or emails)	multiple choice (10 questions)	0,5
		Solar Thermal	2	x			Asynchronous availability for doubts, informations		
		Geothermal heat pumps	2	x					

		Biomass	2	x					
		Procedures for integrating renewable energy systems	2	x					
6.Financial calculation and incentives/ fundings	Financial calculation	i.e. LCCA, payback period, rate of return of the investment; discounted cash flow; net present value, profitability index	4	x	1	Exercise	Assignment and giving feedbacks (videoconf and/or emails)	multiple choice (10 questions)	0,5
	Incentives and fundings	i.e. subsidies, tax credit, feed in tariff, white certificates	2	x			Asynchronous availability for doubts, informations		
7.Energy audit applicative methodology	Metering and measurement equipment (thermography)	i.e. blower door; carbon monoxide detector; Infrared camera; manometer; data logger	3	x	1		Assignment support to the PW development. Feedbacks	2 case studies (SINGLE building and MULTI FAMILY building)	1,5

	Practical examples/ Case studies		6	x		Project work	(videoconf and/or emails)		
	Monitoring, control and regulation of energy consumption parameters	Monitoring, control and regulation of energy consumption parameters and of the microclimate in buildings; elements of home automation and building automation ; the International Performance Measurement and Verification Protocol (IPMVP)	4	x					
8. Project management	Elements of Project management		5				Asynchronius availability for doubts, informations	multiple choice (5 questions)	0,5
9. Communication and marketing	Communication techniques for energy audit	knowledge of non technical communication and	3	x	2		Asynchronius availability for doubts,	multiple choice (5 questions)	0,5

		marketing useful for communication with building owners					informations		
	Presentation of results and reporting	templates for energy reports	3	x	2				
10. Legislation, regulations and contracts	Regulations and procedures for procurement and tenders, working contracts and energy supply contracts, financial instruments	i.e. EPC; ESCO	2	x			Asynchronous availability for doubts, informations	multiple choice (5 questions)	0,5
	European and National legislation concerning energy efficiency, renewables	i.e. Dir.2010/31/CE; dir 2012/27/CE; Dir. 2009/28/CE...and national transposition	2	x					

	European and National standards	i.e. EN 16247; EN 15239; EN 15240; EN 15316; EN 15378; EN 15232 ...UNI 11300 (for Italy)	1		1			
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4.3 ANNEX 3 - Validation checklist

	<i>Compliance with the regional/national system</i>	<i>Similar/ Complementary initiatives</i>	<i>Potential adoption in the national/regional professional and training system</i>	<i>Differences with the NQF or the regional frame</i>	<i>Critical points to be addressed</i>	<i>Opportunity and threats</i>
ENACT profile activities						
ENACT profile competences						
Entry criteria						
Evaluation criteria						
Training program: modules contents						
Training program: modules timing						
Training program: ECVET						
Training program: Learning resources						
Training program: Evaluation criteria						