



Erasmus+



Project Erasmus+: Training and certification model
for photovoltaic trainers with the use of ECVET system
(EU-PV-Trainer). No 2016-1-PL01-KA202-026279

In-depth diagnosis of qualifications requirements for a trainer conducting theoretical and practical training in the field of photovoltaic and a methodology of development a professional competence standard

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**In-depth diagnosis of qualifications requirements for a trainer
conducting theoretical and practical training in the field
of photovoltaic and a methodology of development
a professional competence standard**

Editors:

Katarzyna Sławińska, Mirosław Żurek

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The publication presents the results developed by the PV – trainer partnership within the Intellectual Output O1: **In-depth diagnosis of qualifications requirements for a trainer conducting theoretical and practical training in the field of photovoltaic and a methodology of development a professional competence standard** that includes the following results:

- Result 1. National reports and a comparative report on occupational requirements (skills and competencies) for a photovoltaic trainer in the partner countries.
- Result 2. Methodology of developing the professional competence standard for photovoltaic trainer.

Moreover, the partnership developed the standard for professional competences for the photovoltaic trainer.

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Result 1. NATIONAL REPORTS AND A COMPARATIVE REPORT ON OCCUPATIONAL REQUIREMENTS (SKILLS AND COMPETENCIES) FOR A PHOTOVOLTAIC TRAINER IN THE PARTNER COUNTRIES

1. Introduction

Preliminary analysis carried out at the stage of the project preparation indicated that in the EU there is no commonly accepted standard methodology for describing the professional competence of workers in specific occupations in the labour market. Therefore, it is justified to identify, in each of the partner countries, competence requirements necessary to perform the work as a trainer conducting training in the area of photovoltaic installations.

The task of each of the partners is to develop or participate in the development of (Polish partners) national reports, which will present competency requirements for a photovoltaic installations trainer. As a part of the national reports, regulations in force, the documents of direct relevance to the labour market (e.g. descriptions of occupations, job specifications, qualification standards or professional competences) and related to education (e.g. educational standards, curricula, training materials), which describe the competency requirements to be met by a PV trainer.

The data collected will be used to develop a unified description/standard of professional competence for a PV trainer.

In the comparative studies, a uniform methodology was used (Chapter 1 of the Report) for the study in all partners' countries (Poland, Romania, Spain and Cyprus) that focuses on a comparative analysis of selected documents that describe, among others, profiles, job training, qualifications, which may be a reference point for building the description of the professional competence standard for a PV – trainer in the construction industry.

The subject of comparative studies was the structure and substantive content of the description of the competence requirements contained in official national documents which could serve as a reference point for the development of the professional competence standard for a PV – trainer in the construction industry. It was assumed that competency requirements in the comparative analysis will take into account two areas of competencies requirements:

- 1) for a trainer,
- 2) for PV installations.

In the comparative studies a desk research method was used as the basic method and the panel of experts as the supporting method. The results of the comparative analysis of the research are presented in Chapter 3, and the conclusions and recommendations in Chapter 4. Additional part to the report is a bibliography and source materials that were used at the identification and analysis of the documents stages.

It should be stated that in the partner countries there is no officially accepted separate profession/specialty as a PV trainer, which may have a negative effect on the quality of the training services for PV installers.

Between September 2016 and February 2017, the partners conducted identification and comparative analysis of the qualifications and professional competence for PV trainers which primarily focused on:

- The existence of valid descriptors and standards related to the PV trainer profile (VET school teachers, training centre trainers and company tutors) in the countries concerned in terms of activities, tasks and corresponding skills, knowledge and competences.
- The reference, if the above mentioned descriptors and standards exist, to the European Qualification Framework (EQF), viewed by the partners as a basis of common understanding and

as a mean facilitating transparency when building up the common standard of vocational qualifications for the PV trainers.

- The accreditation of PV trainers from the point of view of national regulations in terms of education level, professional experience, probative period and compulsory pedagogical training. Partners decided to refer to the specific national aims within the research area.

2. The methodology of the comparative studies

In the project and in the conducted research the glossary of terms has been established (Table 1) based on the Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning.

Table 1. Glossary of terms used in the research analysis in Poland, Romania, Spain and Cyprus within the EU-PV Trainer

Term	Definition
European Qualification Framework (EQF)	Adopted in the European Union reference tool to compare the qualification levels of the different qualifications systems in different countries. European Qualifications Framework distinguishes eight levels of qualifications laid down by the requirements for learning outcomes.
National Qualification Framework	National qualifications system' means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. This includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards.
Learning outcomes	Statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence.
Knowledge	The outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual.
Skills	Means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).
Competence	The proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy.

The methodology of the research

In the project, a uniform methodology for the study in all partners' countries was used (Poland, Spain, Romania and Cyprus) that focuses on a comparative analysis of selected documents that describe, among others, profiles, job training, qualifications, which may be a reference point for building the description of the professional competence standard for PV trainers. In the frame of the methodology the following elements were described:

The aims of the research

The aim of the international comparative research in the partner countries (Poland, Spain, Romania and Cyprus) was the analysis of intentionally selected documents describing, among others, profiles, job training, qualifications, which could be a reference point for building the description of the standard of professional competence for a PV trainer.

It was assumed that the competency requirements in the comparative analysis will take into account requirements for the competence areas:

- training,
- appropriate qualifications for PV installers.

Subject of the research

The subject of comparative studies was a structure and substantive content of the description of the competence requirements contained in official national documents which could serve as a point of reference for the development of the standard of professional competence for a PV trainer. It was assumed that competency requirements in the comparative analysis will take into account:

- the area of the requirements for the trainer competence,
- the area of the requirements for the competence appropriate for PV installers.

Research problems

Described purpose of the research will address the following issues:

- In what national documents are there descriptions of trainers' and expertise requirements including industry data relating to installation PV systems?
- On what levels of the EQF and NQF in the partner countries operate qualifications related to the competence of PV trainers?
- What are the existing similarities and differences in the structure of the description of the competence requirements in documents related to a new classification of "PV trainer"?
- What principal areas of professional activity should be done in the area of trainers and specialized (industry) competencies"?

Methods, techniques and research tools

In order to verify formulated research problems it was necessary to explore the appropriate research methods and techniques.

The method of desk research was used to identify and analyse selected documents describing, among others, profiles, job training, qualifications, which are a reference point for building the description of the standard of professional competence for a PV trainer in the construction industry.

The expert method was used in formulating conclusions and recommendations. During the studies, the experts service was used – specialists in creating descriptions of competency requirements and specialists – experts in the training competences and PV installations.

Partners carried out a qualitative research, considered as a discursive approach of reformulation, explanation and, to a certain extent, theorisation of institutional testimonies, practical experiences and human phenomena having progressively become interpretative and based on the criteria of credibility, transferability from one professional context to another, from one sector to another and from one country to another. The partners were sensitive on the problematic related to the mechanisms of macro regulation (governance of the systems) and micro automatism (behaviour of operational organisations and VET providers), in permanent interaction and sources of potential tensions. Thus, the authors of the present report opted for the axiomatic and inductive method of analysis, where perceiving and understanding take more importance at this stage than conceiving and evaluating. Therefore, this qualitative and interpretative approach, aiming at a better understanding of meanings attributed by institutions and organisations to their own injections and by individuals to their own perceptions, has been intended to prepare the next phases of the project, especially the

development of certification and validation model for the professional competences of PV trainers in the countries concerned. Of course, we admit that social and political interest and priorities have an impact on interpretations and choices made by the institutions, professional organisations and individual institutions engaged in the project.

Organisation and the area of the research

The research in Poland, Spain, Romania and Cyprus was conducted between September 2016 and February 2017 with the participation of experts from partner institutions. Each partner has prepared a national report which was submitted to the leader of the operation (ITeE-PIB). Individual three national reports have been analysed at an angle similarities and differences in describing competency requirements aimed at "PV Trainer".

3. Reports on identification of profiles, tasks and professional competence standards and other relevant documents regarding PV trainers in partners' countries

This chapter presents national reports on the identification of tasks, profiles and competence standards for PV trainers in partners' countries.

3.1. Poland

Experience of the Polish partners of the project and the conducted analysis of documents show that **in Poland there is no methodical description of the requirements within the scope of professional competence of the vocational education and training for PV trainers.**

The aim is to identify and conduct a comparative analysis of existing descriptions of professional competence for a PV trainer presented in the form of descriptions of occupations, qualification or professional standards or other equivalent documents, i.e.: core curricula for vocational education, modular education programs based on the methodology of Modules of Employable Skills (MES), bids of the training of commercial companies or other equivalent documents that can be adapted for the purposes of preparing competency requirements for PV trainers in vocational education and training.

The method of analysing documents in the form of qualitative and formal analysis was applied for a comparative analysis. In addition, an internal analysis was also conducted to learn the content of each document, understand it properly and explain, including the separation of their components (elements) and mutual relations – connections among them.

The analysis assumed initially that the profile of competency requirements for a PV trainer will consist of two competencies (Fig. 3.1):

- 1) specialist work related to PV installations,
- 2) and training.

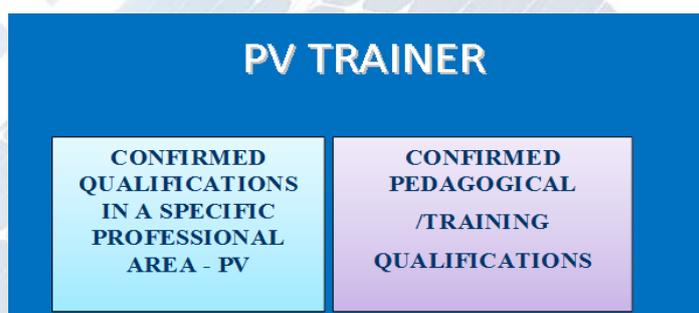


Fig. 3.1. Structure of the qualifications required of a PV trainer

The aim of the study will be to:

- 1) identify professions associated with the PV trainer (with two proposed competences);
- 2) examine the formal requirements for the profession;
- 3) identify competency requirements descriptions (profession descriptions, qualification standards and/or professional capacity, core curricula for vocational education, competence profiles for courses, training, etc.);
- 4) know the structure for the description of competency requirements;
- 5) identify the existing links, connections between the various components of descriptions of relationships;
- 6) make an attempt to develop a common description of the competence requirements at the level of partner countries.

Such an approach is caused by identification of the needs of people conducting or interested in conducting theoretical and / or practical courses in the system of formal education (vocational schools, qualification courses), non-formal (vocational skills courses, training, practical apprenticeships in the workplace, etc.), or eventually – informal aimed at self-education, the aim of which is to prepare to perform professional tasks of PV trainers or self-training (informal learning). The information gathered indicate that during the development of the competence profile for the PV trainer the following issues should be taken into account:

- 1) the development a comprehensive profile, because the trainer should have knowledge and skills in the area of teaching methodology and specialized professional awareness. In Poland, there are often situations that trainers conduct classes based only on the theoretical knowledge of profession without work experience;
- 2) consider the needs of people engaged in vocational education or training already, and especially in this case, fill the gaps in competence during the phase of the preparation of the trainer as well as the preparation of the specialized training;
- 3) meet the expectations of graduates interested in conducting practical training in the PV installations area;
- 4) assist the process of education in workplaces where appointed employees, often without trainer's preparation or with the gaps in expertise or without teaching background, are responsible for teaching students, trainees, apprentices or developing the qualification of new employees or employees already working;
- 5) promote the ideas of modular education, where the essential components of the learning outcomes are skills and knowledge is used to explain their operations.

In Poland, the analysis was based on the following documents:

- 1) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77 / EC and 2003/30 / EC (Dz. U. L 140/16 of 5.6.2009) In particular: Appendix IV: Certification of installers.
- 2) The Act of 20 February 2015. Renewable energy sources (DZ.U. 2015 No. 0 pos. 478) In particular: Chapter 7: The conditions and procedures for issuing certificates to installers of microinstallations, small installations and installation of renewable energy sources with a total installed capacity of heat not greater than 600 kW, and accreditation of training providers
- 3) Regulation of the Ministry of Economy of 25 March 2014 on the conditions and procedures for issuing certificates and accreditation of training providers in the field of renewable energy sources (Dz. U. 2014 No. 0 pos. 505).
- 4) The Polish Standard PN-HD 60364-7-712 Low voltage electrical installations. Part 7-712: Requirements for special installations or locations of photovoltaic (PV) power supply systems.
- 5) Regulation of the Minister of Labour and Social Policy of 7 August 2014 concerning the classification of professions and professional specialities for the needs of labour market, Journal of Laws 2014, item 1145.

- 6) National professional competence standard: *“Renewable energy systems installer” (712902)*.
- 7) National professional skill standard: *“Training Expert” (242403)*.
- 8) Professional qualification standard for the occupation *“Lecturer on courses (educator, trainer 235910)”*.
- 9) Regulation of the Minister of National Education of 7 February 2012 concerning the core curriculum of vocational education (Journal of Laws No. 62, item 439).
- 10) Modular program of the vocational training for the occupations: *Teacher/Instructor (235102); Lecturer on courses (235910); Teacher/Instructor of practical job training (311105)*– (Ministry of Economy, Labour and Social Policy – Department of the Labour Market, Warsaw, December 2003).
- 11) Principles of organising a pedagogical course for the instructors of practical job training (Regulation of the Minister of National Education of 15 December 2010 concerning the practical job training, Journal of Laws No. 244, item 1626).

3.1.1. Identification of competence requirements for specialist work related to PV installations in Poland

1) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources¹

The Directive applies for all EU Member States, that is in all partner countries participating in the EU-PV Trainer project.

Article 14. Information and training states that:

3. Member States shall ensure that certification schemes or equivalent qualification schemes become or are available by 31 December 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate, and shall be based on the criteria laid down in Annex IV. Each Member State shall recognise certification awarded by other Member States in accordance with those criteria.

4. Member States shall make available to the public information on certification schemes or equivalent qualification schemes as referred to in paragraph 3. Member States may also make available the list of installers who are qualified or certified in accordance with the provisions referred to in paragraph 3.

Annex IV sets out the general recommendations for the certification of installers and states that certification schemes or equivalent qualification schemes referred to in Article. 14 paragraph. 3, are based on the following criteria:

1. The certification or qualification process shall be transparent and clearly defined by the Member State or the administrative body they appoint.
2. Biomass, heat pump, shallow geothermal and solar photovoltaic and solar thermal installers shall be certified by an accredited training programme or training provider.
3. The accreditation of the training programme or provider shall be effected by Member States or administrative bodies they appoint. The accrediting body shall ensure that the training programme offered by the training provider has continuity and regional or national coverage. The training provider shall have adequate technical facilities to provide practical training, including some laboratory equipment or corresponding facilities to provide practical training. The training provider shall also offer in addition to the basic training, shorter refresher courses on topical issues, including on new technologies, to enable life-long learning in installations. The training provider may be the manufacturer of the equipment or system, institutes or associations.

¹ <http://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=CELEX:32009L0028&from=PL>, 20.09.2016.

4. The training leading to installer certification or qualification shall include both theoretical and practical parts. At the end of the training, the installer must have the skills required to install the relevant equipment and systems to meet the performance and reliability needs of the customer, incorporate quality craftsmanship, and comply with all applicable codes and standards, including energy and eco-labelling.
5. The training course shall end with an examination leading to a certificate or qualification. The examination shall include a practical assessment of successfully installing biomass boilers or stoves, heat pumps, shallow geothermal installations, solar photovoltaic or solar thermal installations.
6. The certification schemes or equivalent qualification schemes referred to in Article 14(3) shall take due account of the following guidelines:
 - a) Accredited training programmes should be offered to installers with work experience, who have undergone, or are undergoing, the following types of training:
 - (iii) in the case of a solar photovoltaic or solar thermal installer: training as a plumber or electrician and *have plumbing, electrical and roofing skills, including knowledge of soldering pipe joints, gluing pipe joints, sealing fittings, testing for plumbing leaks, ability to connect wiring, familiar with basic roof materials, flashing and sealing methods as a prerequisite*; or
 - (iv) **a vocational training scheme to provide an installer with adequate skills corresponding to : three years education in the skills referred to in point (a), (b) or (c) including both classroom and workplace learning.**
 - d) **The theoretical part of the solar photovoltaic and solar thermal installer training** should give an overview of the *market situation of solar products and cost and profitability comparisons, and cover ecological aspects, components, characteristics and dimensioning of solar systems, selection of accurate systems and dimensioning of components, determination of the heat demand, fire protection, related subsidies, as well as the design, installation, and maintenance of solar photovoltaic and solar thermal installations.* The training should also provide *good knowledge of any European standards for technology, and certification such as Solar Keymark and related national and Community law.* The installer should demonstrate the following **key competences**:
 - (i) *the ability to work safely using the required tools and equipment and implementing safety codes and standards and identify plumbing, electrical and other hazards associated with solar installations;*
 - (ii) *the ability to identify systems and their components specific to active and passive systems, including the mechanical design, and determine the components' location and system layout and configuration;*
 - (iii) *the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar water heater, taking account of shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate and identify different installation methods suitable for roof types and the balance of system equipment required for the installation; and*
 - (iv) *for solar photovoltaic systems in particular, the ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate interconnection point.*
 - e) The installer certification should be time restricted, so that a refresher seminar or event would be necessary for continued certification.

2) The Act of 20 February 2015. Renewable energy sources

The Act responds to the question of what actions have been taken in Poland in the field of accreditation of training providers and certification of installers.

From Chapter 7 about the conditions and procedures for issuing certificates to installers of microinstallations, small installations and installation of renewable energy sources with a total installed capacity of heat not greater than 600 kW, and accreditation of training providers, it may be

assumed that a certificate may be issued to an installer of e.g. photovoltaic systems, who have gained the necessary knowledge and skills through participation in formal education (university, vocational school – Fig. 3.2) or informal (training at an accredited training institution – Fig. 3.3).

In the formal education system validation of learning outcomes for vocational schools is done within an external examination taken by the learner in the Regional Examination Commissions. The exam consists of two parts: theoretical and practical. A diploma confirming vocational qualifications is issued by the Regional Examination Commission (OKE) and becomes basis for the certification of competences of a photovoltaic systems installer, issued by the President of the UDT. The university exam constitutes presentation of a MA thesis in front of an examination board. The certification process consists of two-steps: 1 step – higher education diploma, step 2 – a certificate automatically issued by the President of UDT.

In the case of non-formal education (Fig. 3.3) – people interested in obtaining qualifications of a photovoltaic systems installer are required to complete the basic training in a training centre accredited by the Technical Inspection Office. Validation and certification is carried out by the Technical Inspection Office (UDT).

Conclusion: From the regulations presented, it may be concluded that in Poland installers of photovoltaic systems are certified by the **Technical Inspection Office (UDT)** after the training in a training centre accredited by the UDT.

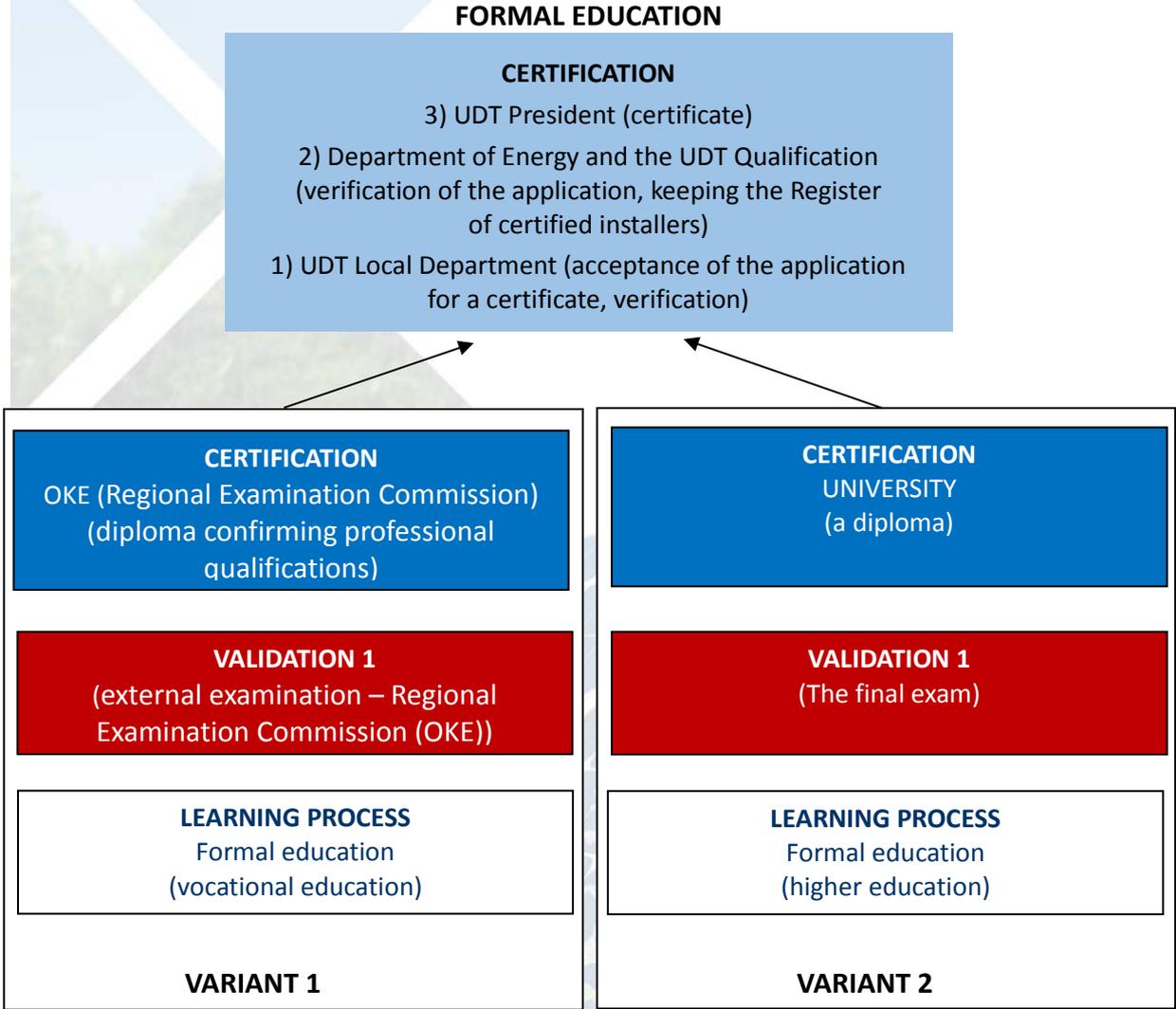


Fig. 3.2. The validation and certification of qualifications for a of photovoltaic systems installer in the formal education system

A certificate issued to a photovoltaic systems installer is valid for 5 years. The reason for the extension include e.g. completion of a short training and the installation process, upgrading or maintaining in proper condition at least five micro-installations, small installations or installations of renewable energy sources, within 12 months preceding the date of the certificate expiry.

An accredited organizer of a basic or refreshing training may be an entity that:

- 1) Offers a training management system;
- 2) Offers housing conditions and equipment to ensure the proper conduct of training;
- 3) Offers staff possessing the necessary qualifications to carry out the training;
- 4) Is accredited by the President of UDT with regard to training appropriate for the type of installation of renewable energy sources.

According to the art. 152 of the Act, the Minister responsible for energy shall determine, by regulation, a curriculum for basic training and refreshing trainings, consisting of theoretical and practical parts, covering the minimum skills and knowledge appropriate for the installation type.

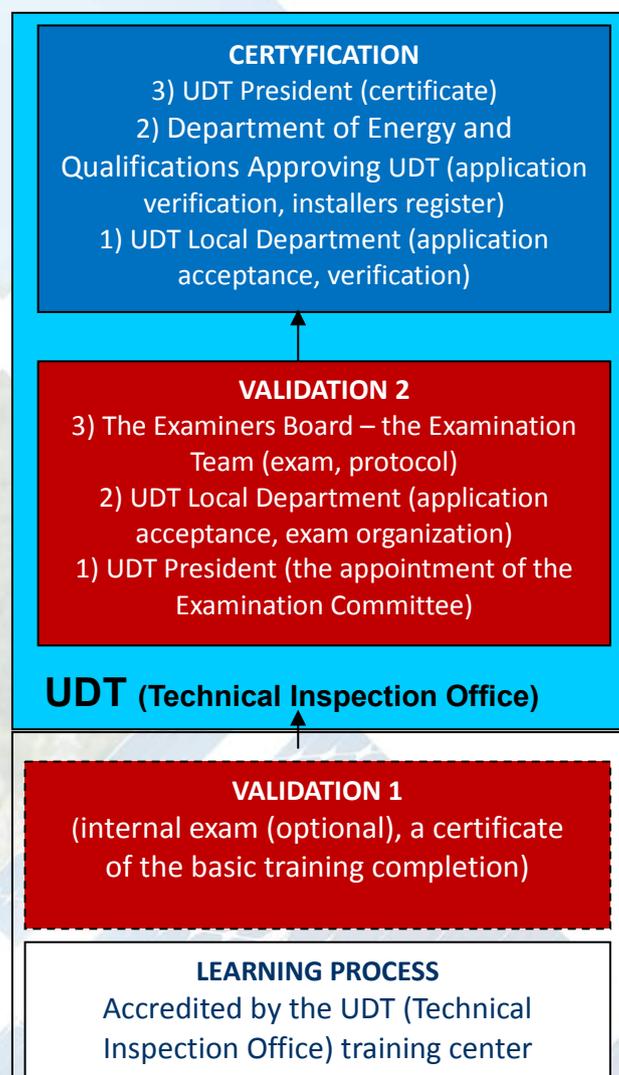


Fig. 3.3. The validation and certification of qualifications for a of photovoltaic systems installer in the formal education system

In art. 158 point. 1., it has been determined that the President of the UDT conducts the ICT system registers of: 1) certified installers, issued certificates and their duplicates; 2) accredited training providers.

According to data from the Technical Inspection Office in Poland in the field of PV:

- 1) in the register of accredited training providers, there are 39 training centers (http://www.udt.gov.pl/wykazy/osrodki_szkoleniowe_OZE.html?OZE, access 04/01/2017);
- 2) in the Register of certified installers, issued certificates and their duplicates entered, there are 1843 people, most of whom are qualified to install PV systems. (https://www.udt.gov.pl/index.php?option=com_content&view=article&id=815&Itemid=1021, 04.01.2017).

3) Regulation of the Ministry of Economy of 25 March 2014 on the conditions and procedures for issuing certificates and accreditation of training providers in the field of renewable energy sources

Although that regulation was repealed by the Act of 20 February 2015 on renewable energy sources, subjecting it to the analysis appears to be justified, because it determines eligibility requirements which should be met by the employers who conduct training in an accredited training center. Annex 4 views the curriculum of basic training with regard to the theoretical and practical parts, appropriately for the installation type.

According to the Regulation an organizer (of trainings for installers) should provide trainees:

- 1) in terms of carrying out theoretical part, who:
 - a) have a university degree or technical specifications, completed postgraduate studies attested by a diploma or certificate issued under the provisions of the Act of 27 July 2005 – Law on Higher Education (Dz. U. of 2012. pos. 572, as amended. zm.4)), and documented a three-year professional practice, or
 - b) have technical secondary education attested by a diploma confirming vocational qualifications issued under the provisions of the Act of 7 September 1991. Education System (Dz. U. of 2004. No. 256, item. 2572, as amended. zm.5)), or equivalent, and documented a five-year apprenticeship training;
- 2) in the field of conducting practical training, who:
 - a) meet the eligibility requirements set out in paragraph 1 or
 - b) have vocational education attested by a diploma confirming vocational qualifications issued under the provisions of the Act of 7 September 1991. Education System, or equivalent document, and a documented five-year professional practice, if such a person performs only practical actions as an instructor.

In the case of photovoltaic systems, the basic training includes the following thematic groups and issues presented in Table 3.1.

Table 3.1. The Curriculum of basic training for photovoltaic systems installers

	Subject groups and issues	Part of training	
		Theoretical (T)	Practical (P)
1	GENERAL AND BASIC ISSUES OF PHOTOVOLTAICS		
	1.1. THE HISTORY AND PERSPECTIVES OF PHOTOVOLTAICS	T	
	1.2. ECONOMIC, ENVIRONMENTAL AND SOCIAL BENEFITS OF PHOTOVOLTAICS	T	
	1.3. NATIONAL REGULATIONS AND POLISH STANDARDS RELATED TO THE APPLICATION OF PV SYSTEMS	T	

	Subject groups and issues	Part of training	
		Theoretical (T)	Practical (P)
	1.3.1. Rights and responsibilities of a certified installer of microinstallations and small PV installations; conditions of obtaining, renewing and a certificate loss	T	
	1.4. REGULATIONS ON HEALTH AND SAFETY IN A WORKPLACE, FIRE AND ENVIRONMENTAL PROTECTION USED DURING THE INSTALLATION-IDENTIFICATION OF HAZARDS	T	
	1.5. SAMPLE SYSTEMS OF PRODUCTS CERTIFICATION (SOLAR KEYMARK)	T	
	1.6. BASIC TERMS AND DEFINITIONS	T	
2	BASIC PHYSICAL PROPERTIES AND THE PRINCIPLES OF PHOTOVOLTAIC SYSTEMS OPERATION		
	2.1. SOLAR LINK – CONSTRUCTION AND OPERATIONAL SYSTEMS	T	
	2.1.1. Photovoltaic conversion-physical fundamentals, structure and technical characteristics of PVcells		
	2.1.2. Structure and technical characteristics of solar cells and other elements of the system		
	2.1.3. Standard test conditions		
	2.1.3.1. Measurement of the links parameters/solar module in standard conditions; the impact of radiation and temperature on the electric parameters of a module/cell.		P
	2.1.4. Combining cells into modules and modules into sets		
	2.2. TYPES OF PV LINKS AND MODULES	T	
	2.2.1. Cells with the monocrystalline silicon		
	2.2.2. Cells with the polycrystalline silicon		
	2.2.3. Cells with the thin film silicon		
	2.2.4. Thin film cells: CIS type, CIGS type, CdTe type and other (in particular: DSSC type, organic, polymer)		
	2.3. TYPES OF PHOTOVOLTAIC SYSTEMS	T	
	2.3.1. Isolated and autonomous systems		
	2.3.2. Systems connected to the grid with and without electricity storage		
	2.3.3. Mixed systems, (hybrid) (in particular photovoltaic system combined with small wind turbines, generators, and fuel cells)		
	2.3.4. Photovoltaic systems integrated into buildings and building structures (BIPV), on roofs, facades, as the glass roofs etc.– and non-integrated systems (BAPV)		P
	2.4. DEVICES AND COMPONENTS OF PHOTOVOLTAIC SYSTEMS	T	
	2.4.1. Batteries in stand-alone photovoltaic systems		
	2.4.2. Charging regulators		
	2.4.3. Types of inverters in PV systems		
	2.4.4. Elements of the installation (cables, connectors, circuit breakers, fuses)		
	2.4.5. Security and protection against lightning and overvoltage in PV systems		
	2.4.6. Mounting options, support structures and anchor profiles for photovoltaic modules		
3	RULES FOR THE SELECTION OF PV SYSTEMS		
	3.1. SELECTION OF TECHNICAL SOLUTIONS		
	3.1.1. Determining the location, orientation and tilt for the solar cell, sunlight, climate conditions, and the methods, installation techniques, depending on the installation site	T	

	Subject groups and issues	Part of training	
		Theoretical (T)	Practical (P)
	3.1.2. A place for the installation (surface, setting the horizon and the geographic south)		
	3.1.3. Shading elements		
	3.1.4. Strength issues for buildings (roofs, facades)		
	3.1.5. Existing lightening protection		P
	3.2. PROFILES OF RECEIVERS	T	P
	3.3. GATHERING AND PROCESSING OF THE WEATHER DATA	T	P
	3.4. SIZING THE SYSTEMS	T	P
	3.4.1. Selecting the type and the power of photovoltaic modules, setting up a PV generator	T	P
	3.4.2. Defining the requirements for selected sections of connecting cables		
	3.4.3. Defining the requirements for the installation of lightning protection, grounding and surge system	T	P
	3.5. AUTONOMOUS PV SYSTEMS		
	3.5.1. Examples of autonomous systems		
	3.5.2. Elements of autonomous systems	T	
	3.5.3. Assessment and test reports		
	3.5.4. Emergency power supply		
	3.6. CONNECTING THE SYSTEM TO THE POWER GRID		
	3.6.1. Calculation of surface and ratings of PV system, necessary subsystems, devices and relevant equipment		
	3.6.2. Choice of an inverter as a transmitter of energy, security features of an inverter, defining efficiency of an inverter	T	P
	3.6.3. Matching the generator to the inverter		
	3.6.4. Synchronizing the system with the power network		
	3.7. POLISH STANDARDS AND TECHNICAL SPECIFICATIONS RELATED TO THE THEMATIC GROUP (IF APPLICABLE)		
4	INSTALLATION AND CONTROL OF THE PV SYSTEMS		
	4.1. HEALTH AND SAFETY WHILE THE INSTALLATION PROCESS	T	P
	4.2. THE INSTALLATION PLAN	T	P
	4.3. DEVICES AND EQUIPMENT FOR INSTALLATION	T	P
	4.4. PRACTICAL TIPS FOR MODULE AND GOODS INSTALLATION, AND DIMENSIONS OF WIRES AND CABLES	T	P
	4.5. SETTING AND STARTING THE PV SYSTEMS		
	4.5.1. Parameters setting and communication with the charging controller and the grid inverter		
	4.5.2. Mounting PV modules on sample support structures	T	P
	4.5.3. Mounting and starting an autonomous system		
	4.5.4. Mounting and starting the grid-connected system		
	4.6. COOPERATION WITH BATTERIES IN AUTONOMOUS SYSTEMS	T	P
	4.7. SURGE	T	P
	4.8. GROUND AND LIGHTENING INSTALLATION	T	P
	4.9. MOUNTING OF PHOTOVOLTAIC SYSTEMS INTEGRATED INTO BUILDINGS AND BUILDING STRUCTURES (BIPV) AND AUTONOMOUS SYSTEMS (BAPV)	T	
	4.10. ANALYSIS OF TYPICAL ERRORS WHILE MOUNTING THE SYSTEMS	T	P
	4.11. CONDITIONS OF RECEIPT AND TECHNICAL INFORMATION ON THE SYSTEM	T	P
5	PERFORMANCE OF THE PV SYSTEMS		
	5.1. VOLTAGE CHARACTERISTICS	T	
	5.2. FACTORS AFFECTING PRODUCTIVITY	T	P
	5.3. THE SYSTEM EVALUATION-QUALITY INDICATORS ANALYSIS	T	P

	Subject groups and issues	Part of training	
		Theoretical (T)	Practical (P)
6	ACTIVITIES RELATED TO THE MODERNIZATION AND MAINTENANCE OF PV SYSTEMS		
	6.1. MAINTENANCE PROGRAM	T	P
	6.2. ANALYSIS OF TYPICAL ERROR RELATED TO THE MODERNIZATION AND MAINTENANCE OF PV SYSTEMS	T	
	6.3. TYPES OF INTERFERENCE OR SYSTEM FAILURE	T	P
	6.4. MONITORING OF SYSTEM FEATURES – GUIDELINES AND REQUIREMENTS FOR MEASUREMENT AND ANALYSIS	T	P
	6.4.1. MEASUREMENT OF CURRENT-VOLTAGE CHARACTERISTICS OF PV MODULES/GENERATORS	T	P
	6.4.2. THERMAL TESTING	T	P

Source: Regulation of the Ministry of Economy of 25 March 2014 on the conditions and procedures for issuing certificates and accreditation of training providers in the field of renewable energy sources.

4) The Polish Standard PN-HD 60364-7-712 Low voltage electrical installations. Part 7-712: Requirements for special installations or locations. Photovoltaic (PV) power supply systems

This standard and standards related to it, define the technical side of the photovoltaic systems use and will be applied when defining training content in the guides for trainers and participants trained.

5) Regulation of the Minister of Labour and Social Policy of 7 August 2014 concerning the classification of professions and professional specialities for the needs of labour market

Pursuant to the Regulation of the Minister of Economy and Labour, from 1 January 2005, the Classification of Professions and Professional Specialities for the Needs of the Labour Market (Regulation of the Minister of Labour and Social Policy of 7 August 2014 concerning the classification of professions and professional specialities for the needs of labour market and the scope of its usage (Journal of Laws, item 1145), is valid in Poland, consistent with the International Standard Classification of Occupations ISCO-08, implemented with the Commission Recommendation². Adjustment of the classification to the ISCO standard allows for international comparisons and exchange of statistical data concerning the occupations. In addition, it enables one to conduct an employment agency and career guidance on an international level. It is a systematised set of professions and professional specialities present on the labour market, including occupations of the vocational education taught in the education system³.

Professions in the classification are grouped according to the four levels of competence specified in ISCO-08 and to the levels of education defined in the International Standard Classification of Education (ISCED 2011). These levels may be referred to the skills required to perform particular professions and professional specialities and to the formal education in various types of schools.

First level of competence means elementary qualifications sufficient for carrying out simple and routine physical and manual tasks, often requiring physical strength and endurance, while in some professions the skill of reading, writing and calculating. It corresponds with education acquired in a primary school.

² Commission Recommendation of 29 October 2009 on the use of the International Standard Classification of Occupations (ISCO-08) (Journal of Laws L 292, 10/11/2009 P. 0031-0047).

³ Key of connections between the classification of professions and professional specialties of 2014 (Journal of Laws of 2014, item 1145) and the International Standard Classification of Occupations (ISCO-08) http://psz.praca.gov.pl/documents/10240/54723/Klucz_powiaz_KZIS%202010-2014%28Dz%20U.z%202014%2Cpoz%201145%29%2Cst.29.12.14.pdf

Second level of competence requires relatively advanced skill of reading, writing and calculating, high level of manual skills, ability of reading information, such as e.g. technical or security instructions and the ability of interpersonal communication. It corresponds with education acquired in a grammar school, general secondary school, specialised secondary school and basic vocational school. In the case of general education, the access to the labour market requires the acquisition of professional competence as a result of vocational training in the course system or on-the-job.

Third level of competence is related to the performance of complex technical and practical tasks, requiring broad substantial, technical and procedural knowledge in a specialised area. It requires interpersonal skills and the ability to understand different types of documents. It corresponds with secondary vocational education acquired in a secondary technical school, school of art (II-grade music, art, ballet and circus school), college and a post-secondary non-tertiary school.

Fourth level of competence is related to the performance of tasks consisting in solving problems and making decisions based on the broad theoretical and substantial knowledge in a given speciality. It requires developed interpersonal skills, the ability to understand complex documents and to communicate complex issues. It corresponds with higher education acquired on the first-cycle studies (undergraduate and engineering), second-cycle studies (graduate and uniform Master's studies), postgraduate studies, and third-cycle studies (doctoral)⁴.

The classification has a hierarchical, five-level structure arising from the grouping of particular professions and professional specialities in elementary groups, which are further grouped in average, big and large groups. This grouping occurs on the basis of the similarity of competence required for performance of tasks in particular professions or professional specialities. The structure of the classification of professions and professional specialities for the needs of the labour market of 2014, similarly as ISCO-08, includes 10 large groups, 43 big groups (internal division of large groups), 133 average groups (internal division of big groups) and 445 elementary groups (internal division of average groups), whereas the elementary groups in the Polish classification include 2,443 professions and professional specialities⁵.

Conclusions: The analysis of the classification of professions and specialities indicates that a PV trainer profession is not indicated in the classification.

The **Polish Classification of professions and specialities for the needs of the labour market** contains 3 professions related to the area of PV installations (Table 3.2).

Table 3.2. List of professions in Poland related to the area of PV installations

Profession code	Name of profession	Level EQF/NQF
215106	Devices and renewable energy sources engineer	6/6
712614	Renewable energy systems installer	3/3
311930	Devices and renewable energy systems technician ⁵	4/4

For the purposes of the project, the professions at the 3 and 4 EQF level will be taken into consideration, i.e. Renewable energy systems installer and Devices and renewable energy systems technician (profession trained in vocational education).

⁴ Gruza M., Hordyjewicz T.: *Klasyfikacja zawodów i specjalności na potrzeby rynku pracy. Tworzenie i stosowanie*. [Classification of Professions and Professional Specialties for the Needs of Labour Market. Development and Application] Ministry of Labour and Social Policy, 2014.

⁵ Alphabetic index of professions and professional specialties of the classification of 2014 – according to the condition as of 22 December 2014, <http://psz.praca.gov.pl/rynek-pracy/bazy-danych/klasyfikacja-zawodow-i-specjalnosci>, access: 16.12.2016.

Table 3 and 4 describe the Renewable energy systems installer and Devices and renewable energy systems technician included in the classification of professions and specialities.

Table 3.3. A description of renewable energy systems installer profession

Name:	Renewable energy systems installer
Code:	712614
Synthesis:	Renewable energy systems installer performs installations for the production of energy from various renewable sources. Renewable energy systems installer assembles devices and execution of installations for generating energy from different types of renewable sources such as solar, wind, biomass, biogas, water, geothermal energy and their maintenance and service during operation. Among the tasks of the installer a few organizational tasks may be mentioned (preparation and securing the installation site from hazards and accidents, preparing the mounting hardware), installation tasks (which depend on the type of installation and cover the selection of tools, materials and equipment; the installation, ongoing supervision and control of the work. drivers and surveillance equipment programming, commissioning of equipment), the tasks of operating (controlling of the equipment and energy systems work, fault diagnosis, preservation, removal and repair of RES), advisory functions (user training in the use of mounted devices, their programming and defining of alarm events).
Professional tasks:	<ul style="list-style-type: none"> – analysis of project documentation for further adaptation to existing environmental and construction conditions, – preparing the equipment and renewable energy systems installation, – matching and the use of machinery, equipment, tools and measurement and control instruments used during the installation process, – installation in stages of the equipment and systems for renewable energy sources, according to the documentation, – controlling the installation and operation of the RES systems at each stage of the process, – programming and configuration of control devices in the installation system, – starting and testing of the complete installation, – connecting the installation system to remote monitoring, – performing work related to the operation of equipment (inspection, maintenance, regulation and repair), – transmission of the system for further use, with the manual, – organizing the workplace in accordance with health and safety standards, fire protection, environmental protection and ergonomics requirements. <p>A renewable energy systems installer should have basic vocational education within the mechanical or electrical field, completed with courses related to the installation of the RES equipment, i.e. electrical, sanitary, heating, cooling or mechanical devices. An employee not having the experience should work under the supervision of a supervisor. It is advisable to have a driving license of B category, since the work can be carried out in an open area and require mobility. An installer should continuously update his knowledge and improve professional skills, therefore, he should participate in the training courses organized by trade associations or specialized training centres. In the case of individual work, it is desirable to have a certificate of a given speciality installer – issued under the provisions of the relevant regulation to the Act.</p>
Additional professional tasks	Note – the description of the professional competence standards for this occupation can be found in the database: www.kwalifikacje.praca.gov.pl .

Source: *Classification of professions and specializations*, <http://psz.praca.gov.pl/rynek-pracy/bazy-danych/klasyfikacja-zawodow-i-specjalnosci/wyszukiwarka-opisow-zawodow> (access: 20.09.2016).

Table 3.4. A description of the devices and renewable energy systems technician profession

Name:	Devices and renewable energy systems technician
Code:	311930
Synthesis:	Designs and oversees the implementation of sanitary and heating installations equipped with devices and renewable energy systems: solar collectors, heat pumps, biomass boilers, for heating buildings and hot water outlet; supervises the maintenance of the proper functioning of sanitary equipment in buildings: water supply, sewage and heating systems.
Professional tasks:	<ul style="list-style-type: none"> – performing sketches and drawings of sanitary and heating installations, – designing the heating system and domestic hot water installation with solar collectors, heat pump and biomass boiler – according to his powers, – establishing, in accordance with the technical documentation, devices and heating systems location, – carrying out construction or technical supervision of installations and sanitary facilities in the building – within the scope of his powers, – carrying out a leak test and a pressure test of the installation, – carrying out the quality control of the installation works and their compliance with the technical documentation and the provisions of the construction law, – overseeing the operation of the sanitary and heating systems installations, – locating and removing of malfunctioning sanitary equipment in the buildings, – organization of work, choice of materials, tools, equipment and machinery to perform sanitary installations in the buildings, – organization of the implementing brigades and managing the work of the working brigade and organizing the course of installation, maintenance and repair including materials and hardware management and the principles of safety, fire and environmental protection, – calculations of installation work, cost estimates and tender offers.
Additional professional tasks:	<ul style="list-style-type: none"> – technical supervision in public administration to advocate and reconcile the documents related to sanitary installations, – advising on the possibility of using the of RES devices, – participation in research related to RES devices – performing complementary (measuring and auxiliary) work.

Source: *Classification of professions and specializations*, <http://psz.praca.gov.pl/rynek-pracy/bazy-danych/klasyfikacja-zawodow-i-specjalnosci/wyszukiwarka-opisow-zawodow> (access: 20.09.2016).

6) National competency standard

In Poland, the database of the Ministry of Family, Labour and Social Policy contains electronic versions of:

- professional competence standards for 300 occupations/specialities,
- professional qualification standards for 253 professions/specialities,
- modular and professional training programs, designed to serve the training for 257 scopes of work.

The analysis of the database with regard to professions related to the area of photovoltaic systems installation has indicated that there is one profession: **Renewable energy systems installer** (712614).

The professional competence standard includes the following information:

1. Identification of the profession

- 1.1. The code, name of the profession and position of the profession in the classifications
- 1.2. Methodological note and the authors

2. Description of the profession

- 2.1. The profession synthesis
- 2.2. The job description and the manner of its execution, the areas of the profession occurrence

- 2.3. Work environment (working conditions, machinery and tools, risks, work organization)
- 2.4. Psychophysical and health requirements, including contraindications to professional practice
- 2.5. Education and permissions necessary to work in the profession
- 2.6. Opportunities for professional development, validation of competences
- 2.7. Professional tasks
- 2.8. List of professional competence
- 2.9. Relations between professional competence and the level of skills in the EQF / PQF
- 3. Description of professional competence
 - 3.1. Installation of devices and renewable energy systems Kz1
 - 3.2. Servicing of the equipment and renewable energy systems Kz2
 - 3.3. Social competence KzS
- 4. Profile of key competences
- 5. Glossary

Profession synthesis

A renewable energy systems installer performs installations for the production of energy from various renewable sources.

The job description and the manner of its execution, the areas of the profession occurrence

A renewable energy systems installer performs installations for the production of energy from various renewable sources, such as: solar, wind, biomass, biogas, water, geothermal energy and their maintenance and service during operation. Among the installer's duties organizational tasks may be enumerated (preparation and securing installation site from hazards and accidents, mounting equipment preparation), installation tasks (which depend on the type of installation and cover the selection of tools, materials and equipment; the installation, ongoing supervision and control of the work, drivers and surveillance equipment programming, commissioning of equipment), operational tasks (controlling the operation of the equipment and energy systems, fault diagnosis, preservation, removal and repair of RES), advisory functions (user training in the use of devices installed, their programming and reading of alarm events).

Work environment (working conditions, machinery and tools, risks, work organization)

The workplace of a renewable energy systems installer is varied and depends on the location of the service. Mostly, these are residential buildings, warehouses, industrial land in open spaces and other facilities located in both urban and rural areas. Performing the tasks is associated with strict observance of safety rules for the work environment. The installation can be done both on the ground and on the top of the building and in the production – assembly hall. The job of a renewable energy systems installer can be performed at a height (roofs), which is associated with the need to have the appropriate permissions. In the course of their work, there may be health risks caused by arduous work, for example: underexposure, excessive sunlight and high temperature on the roofs. The installation process usually requires one shift working system. The installer performs tasks in the team – his work is supervised and often requires security from other team members.

Psychophysical and health requirements, including contraindications to professional practice

Work done by the renewable energy systems installer requires technical skills, sustainability, adaptability to different environments, the ability to work under time pressure, responsibility, ability to focus on the activities undertaken and openness to changes. The installer is required to interact with other employees. The installer should anticipate the effects of the actions taken, to do things at a fast pace and be able to work in a stressful situation. The installer is also required to be in a good state of physical and mental health; sense of balance, eyesight, hearing and psychomotor performance. Contraindication to the profession is the fear of heights, diseases limiting manual mobility, balance disorders, heart defects, respiratory diseases.

Education and powers necessary to work in the profession

A renewable energy systems installer should have basic vocational education within the mechanical or electrical field, completed with courses related to the installation of the RES equipment, i.e. electrical, sanitary, heating, cooling or mechanical devices. An employee not having the experience should work under the supervision of a supervisor. It is advisable to have a driving license of B category, since the work can be carried out in an open area and require mobility. An installer should continuously update his knowledge and improve professional skills, therefore, he should participate in the training courses organized by trade associations or specialized training centres. In the case of individual work, it is desirable to have a certificate of a given speciality installer – issued under the provisions of the relevant regulation to the Act.

Opportunities for professional development, validation of competences

A renewable energy systems installer after confirming the qualification within an exam and having been certified as an installer, after working under supervision, the acquisition of experience in the installation of equipment and performing installation of renewable energy sources and completing a training course on managing people, gains the ability to be promoted for an installation team manager. He is also allowed to run his own business. In larger companies, having numerous installation teams, a promotion up to the boss/ manager of all installation teams level is possible, after completing training in management and health and safety regulations for managers. The installer may participate in qualification courses in skills for the installation of equipment and renewable energy systems and the operation of equipment and renewable energy systems, and after graduation, certify qualifications within the external examinations system organized by the Regional Examination Board. Their education and qualifications can also be developed by becoming a Devices and renewable energy systems technician, profession 311930.

Professional tasks

- Z1. The analysis of the project documentation with regard to adaptation to existing environmental and construction conditions (necessary competence: Kz1, Kz2, KzS).
- Z2. Preparing the equipment and renewable energy systems installations (necessary competence: Kz1, KzS).
- Z3. Selection and use of machinery, devices, tools and measurement and control instruments used during the installation (the necessary competence: Kz1, Kz2, KzS).
- Z4. Installation in stages of devices and renewable energy systems, according to the documentation (essential competencies: Kz1, KzS).
- Z5. Controlling the installation and operation of a RES system at each stage (necessary competence: Kz1, KzS).
- Z6. Programming and setting up control devices installed in the system (the necessary competencies: Kz1, KzS).
- Z7. Commissioning and testing of the complete installation (the necessary competence: Kz1, KzS).
- Z8. Connecting the installation to remote monitoring (essential competencies: Kz1, Kz2, KzS).
- Z9. Performing work related to the operation of equipment (inspection, maintenance, adjustment and repair) (required competencies: Kz2, KzS).
- Z10. Handing the system for use with the manual (the necessary competence: Kz1, KzS).
- Z11. Organizing the workplace in accordance with health and safety, fire and environment protection, the ergonomic requirements (the necessary competence Kz1, Kz2, KzS).

List of professional competences

- Kz1 – Devices and renewable energy systems installation (needed to perform tasks: Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8, Z10, Z11).
- Kz2 – Service of the renewable energy devices and systems (needed to perform tasks: Z1, Z3, Z8, Z9, Z11).
- KzS – Social competences (needed to perform the tasks: Z1 ÷ Z11).

Relations between professional competences and the qualifications level in the ERK / PRK.

Professional competencies needed to perform tasks in the profession are suggested to be used to describe qualifications at level 3 appropriate for basic vocational education in the European and Polish Qualification Framework. This level is a legitimate place for the location of the profession in the classification of professions and specialities (major group 7 and its counterpart in ISCED 2011).

The person performing the profession of a renewable energy systems installer:

- 1) With regard to knowledge: knows and understands basic facts, principles and concepts of work in the profession of a renewable energy systems installer and relationships between selected aspects of the profession; knows and understands the elementary conditions of business activity in the construction industry – renewable energy sources.
- 2) With regard to skills: has the skills required to accomplish tasks and solve problems associated with installation, deinstallation, service, operation and repair of installations of renewable energy sources; is able to perform tasks according to the general technology and manual, in partly changing conditions; knows how to solve simple problems in the performance of professional tasks resulting from the specifics of devices under real environmental conditions; he has communication skills at a sufficient level to provide the necessary information for the user of the system.

Description of professional competences

The description of competences applies only to professional competences defined in studies at workstations.

Performing professional tasks Z1, Z2, Z3, Z4, Z5, Z6, Z7, Z8, Z10, Z11 requires the Kz1 professional competence.

Devices and renewable energy systems Kz1

Knowledge – knows and understands the basic facts, principles, processes, general concepts and relationships associated with the installation of renewable energy devices and systems, in particular knows:

- the rules and regulations of safety, ergonomics, fire protection and environmental protection within the installation of renewable energy devices and systems;
- design documentation, diagnostic and runtime documentation of the renewable energy systems,
- operation principles of renewable energy systems,
- construction of objects in / on which are renewable energy devices are installed, elements and hydraulic systems, energy, thermodynamics and electrical systems depending on the type of renewable source,
- materials and technology of the renewable energy systems installations,
- types of heat pumps and technologies of brine,
- types of solar collectors and methods of installation, depending on the installation site,

Skills – perform simple tasks related to the installation of the renewable energy devices and systems according to the specific instructions in the partially changing conditions, in particular, can:

- follow the rules and safety regulations, fire protection and environmental protection during the renewable energy devices and systems installation,
- use design and diagnostic documentation, operation and maintenance of devices for tasks implementation,
- adapt technical solutions to existing environmental and construction conditions,
- choose and operate the equipment, as well as measuring and controlling instruments,
- install the equipment according to the documentation, and predict the sequence of the installation activities performed,
- prepare and connect a heat source to the heat pump, and the heat pump to the central heating and hot water system,
- attach and secure the solar panels and connect them to the hot water and central heating system,
- attach and protect photovoltaic panels and connect the installations to the internal and external network (Off grid + On grid),

- types of photovoltaic panels and their installation methods, depending on the installation site,
- types of wind turbines and conditions of technical regulations of the installation,
- biogas production technologies and machinery used in the process,
- energy plants and equipment for biomass processing,
- the construction and operation of tools, equipment and control and measurement instruments,
- flowcharts and diagrams of renewable energy systems,
- measuring systems and diagnostic systems in RES installations,
- technical configuration and programming of the renewable energy devices and systems,
- quality standards and evaluation criteria of the installation process.
- attach and secure wind turbines and connect them to internal and external networks (Off grid + On grid),
- adapt heating equipment to biogas use,
- set up and connect to the hot water and central heating system devices using biomass,
- control the operation of the equipment after each stage of the installation,
- program and configure controls installed,
- assess the quality of installation works of the renewable energy devices and systems.

Performing professional tasks Z1, Z3, Z8, Z9, Z11 requires the Kz2 professional competence.

Servicing of the renewable energy devices and systems Kz2

Knowledge – knows and understands the basic facts, principles, processes, general concepts and relationships associated with the installation of renewable energy devices and systems, in particular knows:

- the rules and regulations of safety, ergonomics, fire protection and environmental protection within the installation of renewable energy devices and systems,
- design documentation, diagnostic and runtime documentation of the renewable energy systems,
- principles of maintenance and technical inspections of system devices,
- removable parts of devices and systems,
- principle of dismantling,
- the rules of the installation use,
- the types and causes of failure in RES installations,
- the order of operations related to the dismantling of the devices and installations,
- the provisions on the complaint,
- technical documentation of the renewable energy devices and systems maintenance.

Skills – performs simple tasks related to the installation of the renewable energy devices and systems according to the specific instructions in the partially changing conditions, in particular, can:

- follow the rules and safety regulations, fire protection and environmental protection during the renewable energy devices and systems installation,
- use design and diagnostic documentation, operation and maintenance of devices for tasks implementation,
- instruct the user on the proper and safe operation of the installation,
- perform periodic inspections of the installation,
- diagnose faults in the operation of renewable energy systems,
- replace worn parts,
- replace parts and components damaged in the installation,
- disassemble the installations of renewable energy sources,
- follow the procedures for dealing with complaints concerning the renewable energy devices and systems,
- gather documentation on the operation of renewable energy devices and systems.

Execution of all professional tasks identified in the standard, requires a social competence: KzS.

Social competence KzS:

- is responsible for assembling and servicing of renewable energy devices,
- adapts his behaviour to changes in the work environment,
- works partially independently and takes cooperation within installing and servicing of renewable energy devices in organized working conditions,
- assesses the impact of his actions within collaborative teamwork and takes responsibility for their consequences.

7) The core curriculum for vocational education

Vocational training with regard to professions, listed in the **Classification of professions for vocational education**, is based on the core curriculum for vocational education. Classification of occupations for vocational education in the field of names of professions and their digital symbols is consistent with the International Standard Classification of Professions.

The core curriculum of vocational education are the obligatory sets of learning objectives and content topics described in the form of the expected learning outcomes: knowledge, skills and personal and social competences, necessary for professions or qualifications identified within the professions, included in the curriculum and determining criteria for school grades and examination requirements as well as conditions for implementation of vocational education, including recommended teaching aids and equipment, and a minimum number of hours of vocational training.

Teaching content, described as the expected learning outcomes include:

- 1) Learning outcomes common to all professions, including personal and social competencies.
- 2) Learning outcomes common for occupations within the area of education, which are the foundation for education within a profession or group of professions.
- 3) The learning outcomes relevant to qualifications distinguished within the professions.

THE CORE CURRICULUM OF THE PROFESSION

Devices and renewable energy systems technician 311 930 (section)

LEARNING OBJECTIVES FOR THE PROFESSION

A graduate of schools educating within the profession: Devices and renewable energy systems technician, should be prepared to perform the following professional tasks:

- 1) organize the devices and renewable energy systems installation;
- 2) perform the installation of equipment and renewable energy systems;
- 3) preserve and repair the devices and renewable energy systems;
- 4) control the operation of the devices and renewable energy systems;
- 5) estimate the costs, tenders and contracts concerning devices and renewable energy systems.

B.21. Installation of renewable energy devices and systems

1. Organization of the renewable energy devices and systems installations:

Student:

- 1) uses the documentation, norms and instructions regarding renewable energy devices and systems installation;
- 2) selects the device for renewable energy use;
- 3) selects materials for the installation of devices and renewable energy systems;
- 4) determines the place of location for the devices used in renewable energy systems;
- 5) determines the transport and storage conditions for materials and elements of renewable energy systems;
- 6) selects the equipment and tools for the installation of devices and systems used for the acquisition and processing of renewable energy sources;
- 7) defines the demand for materials for the installation of devices and renewable energy systems;

- 8) takes schematic drawings of devices and renewable energy systems installation;
- 9) prepares schedules of works associated with the installation of devices and renewable energy systems;
- 10) organizes work associated with the installation of devices and renewable energy systems;
- 11) reviews technical equipment and installations using renewable energy sources;
- 12) organizes work associated with the maintenance and repair of devices and renewable energy systems.

2. Estimating the costs, tenders and contracts with regard to the renewable energy devices and systems installation

Student:

- 1) uses the documentation for estimating the costs and the preparation of tenders for the devices and renewable energy systems installation;
- 2) uses catalogues and cost directories, catalogues of materials manufacturers, equipment and elements used in the renewable energy systems installation;
- 3) draws take-off and quantity survey work associated with installation renewable energy devices and systems installation;
- 4) estimates costs for the installation of equipment and renewable energy systems;
- 5) estimates costs associated with the operation of devices and renewable energy systems;
- 6) determines the energy efficiency indicators of devices and renewable energy systems;
- 7) prepares offer for the work associated with installation of devices and renewable energy systems.

3. The installation of devices and renewable energy systems

Student:

- 1) uses the documentation for the installation of devices and renewable energy systems;
- 2) selects the materials, tools and equipment for the assembly of devices using renewable energy;
- 3) defines the place of renewable energy systems installation;
- 4) uses the tools and equipment during the installation of devices and renewable energy systems;
- 5) performs installation of devices and renewable energy systems;
- 6) recognizes the errors of the devices and renewable energy systems installation;
- 7) assesses the quality of assembly works within devices and renewable energy systems installation;
- 8) prepares the devices and renewable energy systems for being received;
- 9) performs work related to maintenance, repair and dismantling of devices and renewable energy systems.

B.22. Operation of devices and renewable energy systems

1. Monitoring and supervision of renewable energy systems

Student:

- 1) reads the indication of measurement and control equipment;
- 2) respects the principles of the of automatic control systems for renewable energy and the regulation of these systems;
- 3) defines the parameters of the renewable energy devices;
- 4) records and interprets the indication of control and measurement devices for renewable energy;
- 5) detects irregularities in the functioning of renewable energy systems;
- 6) evaluates the technical conditions of renewable energy systems;
- 7) minimizes losses during the production, storage, transmission and use of energy;
- 8) takes ongoing maintenance of renewable energy systems;
- 9) prepares documentation on the operation of devices and renewable energy systems.

2. Maintenance and repair of devices and renewable energy systems

Student:

- 1) specifies the requirements for operation of devices and renewable energy systems;
- 2) defines the conditions of maintenance and repair of devices and renewable energy systems;
- 3) follows the procedures for the transmission of equipment and renewable energy systems to the operation process;
- 4) starts devices and systems for renewable energy;
- 5) performs periodic inspections of devices and renewable energy systems;
- 6) determines the causes and methods of removing irregularities in the functioning of devices and renewable energy systems;
- 7) takes measures of the renewable energy systems efficiency;
- 8) respects the procedures for dealing with complaints concerning equipment and renewable energy systems;
- 9) performs measurements and creates inventory sketches of equipment and renewable energy systems;
- 10) performs the activities related to the maintenance and repair of devices and renewable energy systems.

Summary of the competence requirements for a PV installer in Poland

The table prepares the summary list of competence requirements for a PV installer in Poland. For the purposes of comparative analysis we used 4 documents:

- 1) Directive of the European Parliament and Council Directive No. 2009/28 / EC of 23 April 2009. On the promotion of the use of energy from renewable sources (Access: <http://eur-lex.europa.eu/legal-content/PL/TXT / HTML /? uri = CELEX: 32009L0028 & from = EN, 09.20.2016>).
- 2) Regulation of the Minister of Economy of 25 March 2014. On the conditions and procedures for issuing certificates and accredit training providers in the field of renewable energy sources.
- 3) Description of the profession: Devices and renewable energy systems installer.
- 4) The national standard of professional competence.

Table 3.6. The summary list of competence requirements for a PV installer in Poland

	Directive PEIR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
Synthesis			A renewable energy systems installer performs installations for the production of energy from various renewable sources, such as: solar, wind, biomass, biogas, water, geothermal energy and their maintenance and service during operation. Among the installer's duties organizational tasks may be enumerated (preparation and securing installation site from hazards and accidents, mounting equipment preparation), installation tasks (which depend on the type of installation and cover the selection of tools, materials and equipment; the installation, ongoing supervision and control of the work, drivers and surveillance equipment programming, commissioning of equipment), operational tasks (controlling the operation of	A renewable energy systems installer performs installations for the production of energy from various renewable sources.

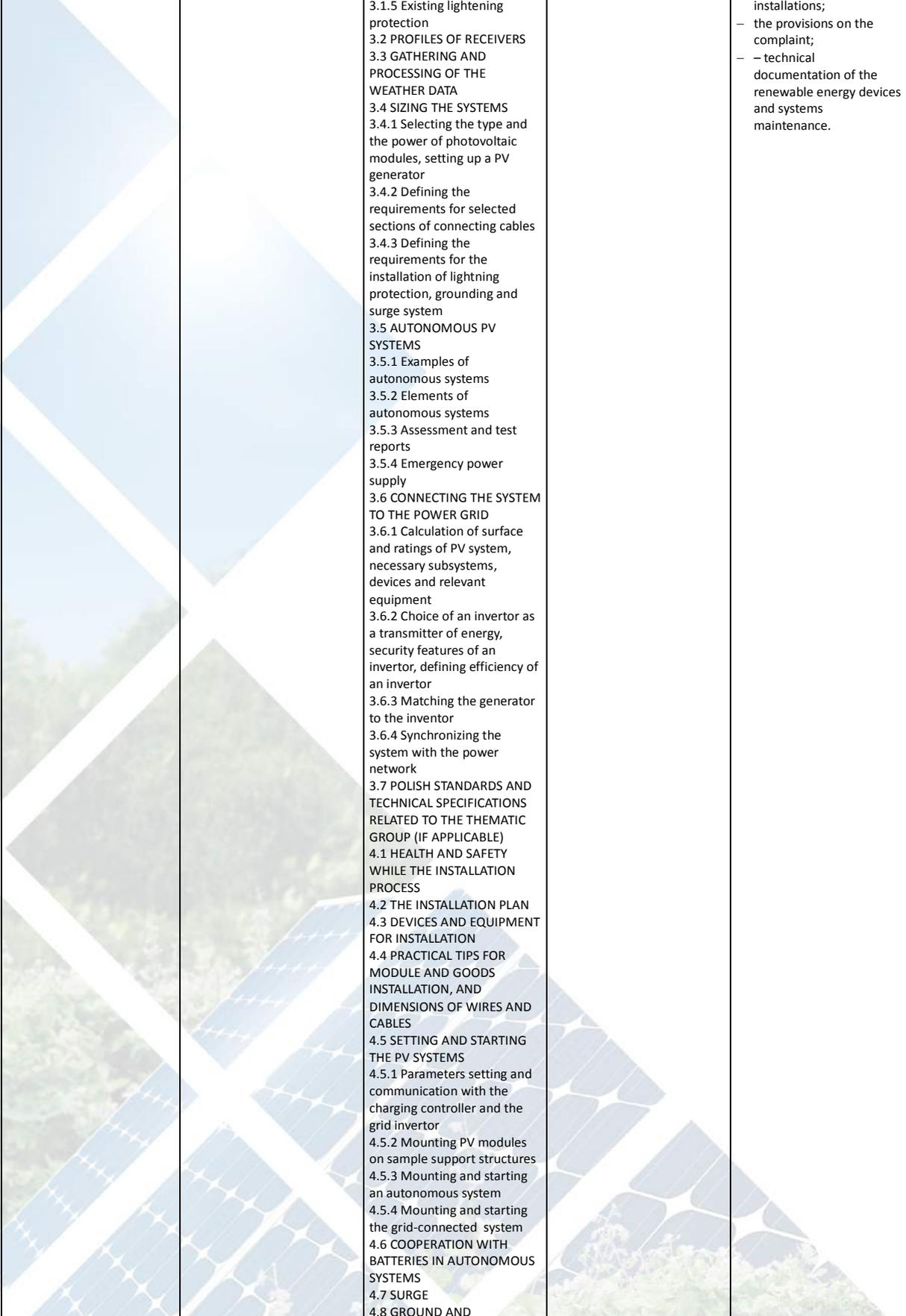
	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
			the equipment and energy systems, fault diagnosis, preservation, removal and repair of RES), advisory functions (user training in the use of devices installed, their programming and reading of alarm events).	
Professional tasks			<ul style="list-style-type: none"> – analysis of project documentation for further adaptation to existing environmental and construction conditions; – preparing the equipment and renewable energy systems installation; – matching and the use of machinery, equipment, tools and measurement and control instruments used during the installation process; – installation in stages of the equipment and systems for renewable energy sources, according to the documentation; – controlling the installation and operation of the RES systems at each stage of the process; – programming and configuration of control devices in the installation system; – starting and testing of the complete installation – connecting the installation system to remote monitoring; – performing work related to the operation of equipment (inspection, maintenance, regulation and repair); – transmission of the system for further use, with the manual; – organizing the workplace in accordance with health and safety standards, fire protection, environmental protection and ergonomics requirements. <p>A renewable energy systems installer should have basic vocational education within the mechanical or electrical field, completed with courses related to the installation of the RES equipment, i.e. electrical, sanitary, heating, cooling or mechanical devices. An employee not having the experience should work under the supervision of a supervisor. It is advisable to have a driving license of B category, since the work can be carried out in an open area and require mobility. An installer should continuously update his knowledge and improve professional skills, therefore, he should</p>	<p>Z1. The analysis of the project documentation with regard to adaptation to existing environmental and construction conditions (necessary competence: Kz1, Kz2, KzS).</p> <p>Z2. Preparing the equipment and renewable energy systems installations (necessary competence: Kz1, KzS).</p> <p>Z3. Selection and use of machinery, devices, tools and measurement and control instruments used during the installation (the necessary competence: Kz1, Kz2, KzS).</p> <p>Z4. Installation in stages of devices and renewable energy systems, according to the documentation (essential competencies: Kz1, KzS).</p> <p>Z5. Controlling the installation and operation of a RES system at each stage (necessary competence: Kz1, KzS).</p> <p>Z6. Programming and setting up control devices installed in the system (the necessary competencies: Kz1, KzS).</p> <p>Z7. Commissioning and testing of the complete installation (the necessary competence: Kz1, KzS).</p> <p>Z8. Connecting the installation to remote monitoring (essential competencies: Kz1, Kz2, KzS).</p> <p>Z9. Performing work related to the operation of equipment (inspection, maintenance, adjustment and repair) (required competencies: Kz2, KzS).</p> <p>Z10. Handing the system for use with the manual (the necessary competence: Kz1, KzS).</p> <p>Z11. Organizing the workplace in accordance with health and safety, fire and environment protection, the ergonomic requirements (the necessary competence Kz1, Kz2, KzS).</p>

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
			participate in the training courses organized by trade associations or specialized training centres. In the case of individual work, it is desirable to have a certificate of a given speciality installer – issued under the provisions of the relevant regulation to the Act	
The job description and the manner of its execution, the areas of the profession occurrence				A renewable energy systems installer performs installations for the production of energy from various renewable sources, such as: solar, wind, biomass, biogas, water, geothermal energy and their maintenance and service during operation. Among the installer's duties organizational tasks may be enumerated (preparation and securing installation site from hazards and accidents, mounting equipment preparation), installation tasks (which depend on the type of installation and cover the selection of tools, materials and equipment; the installation, ongoing supervision and control of the work, drivers and surveillance equipment programming, commissioning of equipment), operational tasks (controlling the operation of the equipment and energy systems, fault diagnosis, preservation, removal and repair of RES), advisory functions (user training in the use of devices installed, their programming and reading of alarm events).
Work environment (working conditions, machinery and tools, risks, work organization)				The workplace of a renewable energy systems installer is varied and depends on the location of the service. Mostly, these are residential buildings, warehouses, industrial land in open spaces and other facilities located in both urban and rural areas. Performing the tasks is associated with strict observance of safety rules for the work environment. The installation can be done both on the ground and on the top of the building and in the production– assembly hall. The job of a renewable energy systems installer can be performed at a height (roofs), which is associated with the need to have the appropriate permissions. In the course of their work, there may be health risks caused by arduous work, for example: underexposure, excessive sunlight and high

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
				temperature on the roofs. The installation process usually requires one shift working system. The installer performs tasks in the team – his work is supervised and often requires security from other team members.
Psychophysical and health requirements, including contraindications to professional practice				Work done by the renewable energy systems installer requires technical skills, sustainability, adaptability to different environments, the ability to work under time pressure, responsibility, ability to focus on the activities undertaken and openness to changes. The installer is required to interact with other employees. The installer should anticipate the effects of the actions taken, to do things at a fast pace and be able to work in a stressful situation. The installer is also required to be in a good state of physical and mental health; sense of balance, eyesight, hearing and psychomotor performance. Contraindication to the profession is the fear of heights, diseases limiting manual mobility, balance disorders, heart defects, respiratory diseases.
Education and powers necessary to work in the profession				A renewable energy systems installer should have basic vocational education within the mechanical or electrical field, completed with courses related to the installation of the RES equipment, i.e. electrical, sanitary, heating, cooling or mechanical devices. An employee not having the experience should work under the supervision of a supervisor. It is advisable to have a driving license of B category, since the work can be carried out in an open area and require mobility. An installer should continuously update his knowledge and improve professional skills, therefore, he should participate in the training courses organized by trade associations or specialized training centres. In the case of individual work, it is desirable to have a certificate of a given speciality installer – issued under the provisions of the relevant regulation to the Act.

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
<p>Opportunities for professional development, validation of competences</p>				<p>A renewable energy systems installer after confirming the qualification within an exam and having been certified as an installer, after working under supervision, the acquisition of experience in the installation of equipment and performing installation of renewable energy sources and completing a training course on managing people, gains the ability to be promoted for an installation team manager. He is also allowed to run his own business. In larger companies, having numerous installation teams, a promotion up to the boss/ manager of all installation teams level is possible, after completing training in management and health and safety regulations for managers. The installer may participate in qualification courses in skills for the installation of equipment and renewable energy systems and the operation of equipment and renewable energy systems, and after graduation, certify qualifications within the external examinations system organized by the Regional Examination Board. Their education and qualifications can also be developed by becoming a Devices and renewable energy systems technician, profession 311930.</p>
<p>Theoretical knowledge</p>	<ul style="list-style-type: none"> - the market situation of solar products and present cost and profitability comparisons, - ecological aspects, components, characteristics and size of solar systems, - selection of accurate systems and dimensioning of components, - identify the need for heat energy, logistics, fire protection, related funds, - design, installation and maintenance of solar photovoltaic and solar installations using heat, - European technology standards and certification systems, such as Solar Keymark, - the provisions of national and Community law 	<ul style="list-style-type: none"> 1.1 The history and perspectives of photovoltaics 1.2 Economic, environmental and social benefits of photovoltaics 1.3 National regulations and Polish standards related to the application of PV systems 1.3.1 Rights and responsibilities of a certified installer of microinstallations and small PV installations; conditions of obtaining, renewing and a certificate loss 1.4 Regulations on health and safety in a workplace, fire and environmental protection used during the installation-identification of hazards 1.5 Sample systems of products certification (Solar Keymark) 1.6 Basic terms and definitions 2.1 Solar link – construction and operational systems 2.1.1 Photovoltaic conversion-physical fundamentals, structure and technical characteristics of PVcells 2.1.2 Structure and technical characteristics of solar cells 		<p>Knowledge – knows and understands the basic facts, principles, processes, general concepts and relationships associated with the installation of renewable energy devices and systems, in particular knows:</p> <ul style="list-style-type: none"> - the rules and regulations of safety, ergonomics, fire protection and environmental protection within the installation of renewable energy devices and systems; - design documentation, diagnostic and runtime documentation of the renewable energy systems; - operation principles of renewable energy systems; - construction of objects in / on which are renewable energy devices are installed; - elements and hydraulic systems, energy, thermodynamics and electrical systems depending on the type of renewable source;

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
		<p>and other elements of the system</p> <p>2.1.3 Standard test conditions</p> <p>2.1.3.1 Measurement of the links parameters/solar module in standard conditions; the impact of radiation and temperature on the electric parameters of a module/cell.</p> <p>2.1.4 Combining cells into modules and modules into sets</p> <p>2.2 TYPES OF PV LINKS AND MODULES</p> <p>2.2.1 Cells with the monocrystalline silicon</p> <p>2.2.2 Cells with the polycrystalline silikon</p> <p>2.2.3 Cells with the thin film silicon</p> <p>2.2.4 Thin film cells: CIS type, CIGS type, CdTe type and other (in particular: DSSC type, organic, polymer)</p> <p>2.3 TYPES OF PHOTOVOLTAIC SYSTEMS</p> <p>2.3.1 Isolated and autonomous systems</p> <p>2.3.2 Systems connected to the grid with and without electricity storage</p> <p>2.3.3 Mixed systems, (hybrid) (in particular photovoltaic system combined with small wind turbines, generators, and fuel cells)</p> <p>2.3.4 Photovoltaic systems integrated into buildings and building structures (BIPV), on roofs, facades, as the glass roofs etc. – and non-integrated systems (BAPV)</p> <p>2.4 DEVICES AND COMPONENTS OF PHOTOVOLTAIC SYSTEMS</p> <p>2.4.1 Batteries in stand-alone photovoltaic systems</p> <p>2.4.2 Charging regulators</p> <p>2.4.3 Types of inverters in PV systems</p> <p>2.4.4 Elements of the installation (cables, connectors, circuit breakers, fuses)</p> <p>2.4.5 Security and protection against lightning and over voltage in PV systems</p> <p>2.4.6 Mounting options, support structures and anchor profiles for photovoltaic modules</p> <p>3.1 SELECTION OF TECHNICAL SOLUTIONS</p> <p>3.1.1 Determining the location, orientation and tilt for the solar cell, sunlight, climate conditions, and the methods, installation techniques, depending on the installation site</p> <p>3.1.2 A place for the installation (surface, setting the horizon and the geographic south)</p> <p>3.1.3 Shading elements</p> <p>3.1.4 Strength issues for buildings (roofs, facades)</p>		<ul style="list-style-type: none"> – materials and technology of the renewable energy systems installations; – types of heat pumps and technologies of brine; – types of solar collectors and methods of installation, depending on the installation site; – types of photovoltaic panels and their installation methods, depending on the installation site; – types of wind turbines and conditions of technical regulations of the installation; – biogas production technologies and machinery used in the process; – energy plants and equipment for biomass processing; – the construction and operation of tools, equipment and control and measurement instruments; – flowcharts and diagrams of renewable energy systems; – measuring systems and diagnostic systems in RES installations; – technical configuration and programming of the renewable energy devices and systems; – quality standards and evaluation criteria of the installation process. <p>Knowledge – knows and understands the basic facts, principles, processes, general concepts and relationships associated with the installation of renewable energy devices and systems, in particular knows:</p> <ul style="list-style-type: none"> – the rules and regulations of safety, ergonomics, fire protection and environmental protection within the installation of renewable energy devices and systems; – design documentation, diagnostic and runtime documentation of the renewable energy systems; – principles of maintenance and technical inspections of system devices; – removable parts of devices and systems; – principle of dismantling; – the rules of the installation use; – the types and causes of failure in RES installations; – the order of operations related to the dismantling of the devices and

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
		<p>3.1.5 Existing lightening protection</p> <p>3.2 PROFILES OF RECEIVERS</p> <p>3.3 GATHERING AND PROCESSING OF THE WEATHER DATA</p> <p>3.4 SIZING THE SYSTEMS</p> <p>3.4.1 Selecting the type and the power of photovoltaic modules, setting up a PV generator</p> <p>3.4.2 Defining the requirements for selected sections of connecting cables</p> <p>3.4.3 Defining the requirements for the installation of lightning protection, grounding and surge system</p> <p>3.5 AUTONOMOUS PV SYSTEMS</p> <p>3.5.1 Examples of autonomous systems</p> <p>3.5.2 Elements of autonomous systems</p> <p>3.5.3 Assessment and test reports</p> <p>3.5.4 Emergency power supply</p> <p>3.6 CONNECTING THE SYSTEM TO THE POWER GRID</p> <p>3.6.1 Calculation of surface and ratings of PV system, necessary subsystems, devices and relevant equipment</p> <p>3.6.2 Choice of an inverter as a transmitter of energy, security features of an inverter, defining efficiency of an inverter</p> <p>3.6.3 Matching the generator to the inverter</p> <p>3.6.4 Synchronizing the system with the power network</p> <p>3.7 POLISH STANDARDS AND TECHNICAL SPECIFICATIONS RELATED TO THE THEMATIC GROUP (IF APPLICABLE)</p> <p>4.1 HEALTH AND SAFETY WHILE THE INSTALLATION PROCESS</p> <p>4.2 THE INSTALLATION PLAN</p> <p>4.3 DEVICES AND EQUIPMENT FOR INSTALLATION</p> <p>4.4 PRACTICAL TIPS FOR MODULE AND GOODS INSTALLATION, AND DIMENSIONS OF WIRES AND CABLES</p> <p>4.5 SETTING AND STARTING THE PV SYSTEMS</p> <p>4.5.1 Parameters setting and communication with the charging controller and the grid inverter</p> <p>4.5.2 Mounting PV modules on sample support structures</p> <p>4.5.3 Mounting and starting an autonomous system</p> <p>4.5.4 Mounting and starting the grid-connected system</p> <p>4.6 COOPERATION WITH BATTERIES IN AUTONOMOUS SYSTEMS</p> <p>4.7 SURGE</p> <p>4.8 GROUND AND</p>		<p>installations;</p> <ul style="list-style-type: none"> - the provisions on the complaint; - technical documentation of the renewable energy devices and systems maintenance.

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
		<p>LIGHTENING INSTALLATION</p> <p>4.9 MOUNTING OF PHOTOVOLTAIC SYSTEMS INTEGRATED INTO BUILDINGS AND BUILDING STRUCTURES (BIPV) AND AUTONOMOUS SYSTEMS (BAPV)</p> <p>4.10 ANALYSIS OF TYPICAL ERRORS WHILE MOUNTING THE SYSTEMS</p> <p>4.11 CONDITIONS OF RECEIPT AND TECHNICAL INFORMATION ON THE SYSTEM</p> <p>5.1 VOLTAGE CHARACTERISTICS</p> <p>5.2 FACTORS AFFECTING PRODUCTIVITY</p> <p>5.3 THE SYSTEM EVALUATION-QUALITY INDICATORS ANALYSIS</p> <p>6.1 MAINTENANCE PROGRAM</p> <p>6.2 ANALYSIS OF TYPICAL ERROR RELATED TO THE MODERNIZATION AND MAINTENANCE OF PV SYSTEMS</p> <p>6.3 TYPES OF INTERFERENCE OR SYSTEM FAILURE</p> <p>6.4 MONITORING OF SYSTEM FEATURES – GUIDELINES AND REQUIREMENTS FOR MEASUREMENT AND ANALYSIS</p> <p>6.4.1 MEASUREMENT OF CURRENT-VOLTAGE CHARACTERISTICS OF PV MODULES/GENERATORS</p> <p>6.4.2 THERMAL TESTING</p>		
skills	<p>ability to work safely using the required tools and equipment and implementing safety codes and standards and identify plumbing, electrical and other hazards associated with solar installations</p> <p>ability to identify systems and their components specific to active and passive systems, including the mechanical design, and determine the components' location and system layout and configuration;</p> <p>the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar devices using solar water heater, taking into account shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate as well as the ability to identify different methods of installation suitable for roof types and the balance of components of the installation;</p> <p>skills, in particular with regard to photovoltaic systems, ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical</p>	<p>2.1.3 Standard test conditions</p> <p>2.1.3.1 Measurement of the links parameters/solar module in standard conditions; the impact of radiation and temperature on the electric parameters of a module/cell.</p> <p>2.1.4 Combining cells into modules and modules into sets</p> <p>2.3.4 Photovoltaic systems integrated into buildings and building structures (BIPV), on roofs, facades, as the glass roofs etc. – and non-integrated systems (BAPV)</p> <p>3.1.5 Existing lightning protection</p> <p>3.2 PROFILES OF RECEIVERS</p> <p>3.3 GATHERING AND PROCESSING OF THE WEATHER DATA</p> <p>3.4 SIZING THE SYSTEMS</p> <p>3.4.1 Selecting the type and the power of photovoltaic modules, setting up a PV generator</p> <p>3.4.2 Defining the requirements for selected sections of connecting cables</p> <p>3.4.3 Defining the requirements for the installation of lightning protection, grounding and surge system</p> <p>3.6 CONNECTING THE SYSTEM TO THE POWER GRID</p> <p>3.6.1 Calculation of surface</p>		<p>Skills – perform simple tasks related to the installation of the renewable energy devices and systems according to the specific instructions in the partially changing conditions, in particular, can:</p> <ul style="list-style-type: none"> – follow the rules and safety regulations, fire protection and environmental protection during the renewable energy devices and systems installation; – use design and diagnostic documentation, operation and maintenance of devices for tasks implementation; – adapt technical solutions to existing environmental and construction conditions; – choose and operate the equipment, as well as measuring and controlling instruments; – install the equipment according to the documentation, and predict the sequence of the installation activities performed; – prepare and connect a heat source to the heat pump, and the heat pump to the central heating and hot water system;

	Directive PEiR NR 2009/28/WE	Curriculum for basic training courses Regulation MG 03.25.2014	Description of the profession: a renewable energy systems installer	Professional competences standard
	<p>circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate connection point</p>	<p>and ratings of PV system, necessary subsystems, devices and relevant equipment</p> <p>3.6.2 Choice of an inverter as a transmitter of energy, security features of an inverter, defining efficiency of an inverter</p> <p>3.6.3 Matching the generator to the inverter</p> <p>3.6.4 Synchronizing the system with the power network</p> <p>4.1 HEALTH AND SAFETY WHILE THE INSTALLATION PROCESS</p> <p>4.2 THE INSTALLATION PLAN</p> <p>4.3 DEVICES AND EQUIPMENT FOR INSTALLATION</p> <p>4.4 PRACTICAL TIPS FOR MODULE AND GOODS INSTALLATION, AND DIMENSIONS OF WIRES AND CABLES</p> <p>4.5 SETTING AND STARTING THE PV SYSTEMS</p> <p>4.5.1 Parameters setting and communication with the charging controller and the grid inverter</p> <p>4.5.2 Mounting PV modules on sample support structures</p> <p>4.5.3 Mounting and starting an autonomous system</p> <p>4.5.4 Mounting and starting the grid-connected system</p> <p>4.6 COOPERATION WITH BATTERIES IN AUTONOMOUS SYSTEMS</p> <p>4.7 SURGE</p> <p>4.8 GROUND AND LIGHTENING INSTALLATION</p> <p>4.9 MOUNTING OF PHOTOVOLTAIC SYSTEMS INTEGRATED INTO BUILDINGS AND BUILDING STRUCTURES (BIPV) AND AUTONOMOUS SYSTEMS (BAPV)</p> <p>4.10 ANALYSIS OF TYPICAL ERRORS WHILE MOUNTING THE SYSTEMS</p> <p>4.11 CONDITIONS OF RECEIPT AND TECHNICAL INFORMATION ON THE SYSTEM</p> <p>5.1 VOLTAGE CHARACTERISTICS</p> <p>5.2 FACTORS AFFECTING</p> <p>5.3 THE SYSTEM EVALUATION-QUALITY INDICATORS ANALYSIS</p> <p>6.1 MAINTENANCE PROGRAM</p> <p>6.3 TYPES OF INTERFERENCE OR SYSTEM FAILURE</p> <p>6.4 MONITORING OF SYSTEM FEATURES – GUIDELINES AND REQUIREMENTS FOR MEASUREMENT AND ANALYSIS</p> <p>6.4.1 Measurement of current-voltage characteristics of PV modules/generators</p> <p>6.4.2 Thermal testing</p>		<ul style="list-style-type: none"> – attach and secure the solar panels and connect them to the hot water and central heating system; – attach and protect photovoltaic panels and connect the installations to the internal and external network (Off grid + On grid); – attach and secure wind turbines and connect them to internal and external networks (Off grid + On grid); – adapt heating equipment to biogas use; – set up and connect to the hot water and central heating system devices using biomass; – control the operation of the equipment after each stage of the installation; – program and configure controls installed; – assess the quality of installation works of the renewable energy devices and systems. <p>Skills – performs simple tasks related to the installation of the renewable energy devices and systems according to the specific instructions in the partially changing conditions, in particular, can:</p> <ul style="list-style-type: none"> – follow the rules and safety regulations, fire protection and environmental protection during the renewable energy devices and systems installation; – use design and diagnostic documentation, operation and maintenance of devices for tasks implementation; – instruct the user on the proper and safe operation of the installation; – perform periodic inspections of the installation; – diagnose faults in the operation of renewable energy systems; – replace worn parts; – replace parts and components damaged in the installation; – disassemble the installations of renewable energy sources; – follow the procedures for dealing with complaints concerning the renewable energy devices and systems; – gather documentation on the operation of renewable energy devices and systems.

3.1.2. Identification of competence requirements for specialist work related to PV installations in Poland

The chapter seeks to answer the following question: **Who, in accordance with applicable regulations, may be a PV trainer and provide training in Poland?**

In order to give the answer to the question, the following acts were analyzed:

- 1) Regulation of the Minister of Economy of 25 March 2014. On the conditions and procedures for issuing certificates and accredit training providers in the field of renewable energy sources, OJ 2014 item. 505 (repealed by the Act of 20 February 2015. Renewable energy OJ 2015 No. 0 pos. 478 2016.11.05);
- 2) Act of 7 September 1991. Education System (Dz. U. of 2004. No. 256, item. 2572, as amended);
- 3) Regulation of the Minister of National Education of 11 January 2012. On lifelong learning in school (OJ 2012 No. 0 pos. 186, as amended);
- 4) Regulation of the Minister of National Education of 15 December 2010. On apprenticeship (Dz. U. No 244, item. 1626);
- 5) The Law on Higher Education of July 27, 2015 year (Journal of Laws of 2005 No. 164, item. 1365, as amended);
- 6) Regulation of the Minister of Labour and Social Policy of 7 August 2014. On the classification of professions and specialties for the needs of the labour market and its scope (OJ 2014 pos. 1145).

According to the Regulation of the Minister of Economy of 25 March 2014 On the conditions and procedures for issuing certificates and accredit training providers in the field of renewable energy sources organizers (of courses for installers) should provide trainers who:

- 1) in terms of carrying out theoretical part, who:
 - a) have a university degree or technical specifications, completed postgraduate studies attested by a diploma or certificate issued under the provisions of the Act of 27 July 2005 – Law on Higher Education (Dz. U. of 2012. pos. 572, as amended. zm.4)), and documented a three-year professional practice, or
 - b) have technical secondary education attested by a diploma confirming vocational qualifications issued under the provisions of the Act of 7 September 1991. Education System (Dz. U. of 2004. No. 256, item. 2572, as amended. zm.5)), or equivalent, and documented a five-year apprenticeship training;
- 2) in the field of conducting practical training, who:
 - a) meet the eligibility requirements set out in paragraph 1 or
 - b) have vocational education attested by a diploma confirming vocational qualifications issued under the provisions of the Act of 7 September 1991. Education System, or equivalent document, and a documented five-year professional practice, if such a person performs only practical actions as an instructor.

From the foregoing analysis it is visible that in Poland no set of requirements for obligatory teaching/training qualifications, in relation to the trainers of future PV installers, has not been specified.

Teaching / training qualifications necessary to conduct classes in Poland may be gained as a part of the formal and non-formal education:

- 1) Formal education:
 - teachers, academics and formal education trainers² (training/teaching skills acquired at a higher education institution by completing pedagogical studies (BA, MA), or post-graduate education) – 6-7 level EQF.

2) Non-formal education:

- apprenticeship instructor – the acquisition of skills by completing the pedagogical course organized by training institutions (formal education) – 5 level EQF;
- lecturer at courses (educator, trainer) (code of the profession: 235915) – the acquisition of skills through the completion of modular training organized by the training institutions (formal education) – 5 level EQF;
- trainer – as an offer of training companies.

Taking into account the specifics of the project, we offer gaining teaching/training qualifications by participating in a course offered in the framework of non-formal education. Therefore, in the further part of the study, we will concentrate on the requirements of competence specified in the pedagogical course, leading to the acquisition of qualifications within the profession: a lecturer at courses (educator, trainer) or a trainer (commercial courses).

1) Acquisition of teaching-training qualifications by completing a pedagogical course for apprenticeship instructors

Pursuant to the Act of 7 September 1991 on the Education System (Journal of Laws of 2004, No. 256, item 2572 as amended), the Regulation of the Minister of National Education of 15 December 2010 concerning the practical job training (Journal of Laws No. 244, item 1626) and the Regulation of the Minister of National Education of 11 January 2012 (Journal of Laws 2012, item 186) concerning the continuing education in extracurricular forms, a pedagogical course for the instructors of practical job training may be organised by:

- a) continuing education institutions, practical education institutions, vocational development and improvement centres, enabling one to acquire and supplement knowledge, skills and professional qualifications (Article 2 point 3 of the Act on the Education System);
- b) legal and natural persons running the educational activity referred to in Article 83a section 2 of the Act on the Education System, including conducting the continuing education in extracurricular forms, for which they have obtained the accreditation, referred to in Article 68b of the Act on the Education System.

A pedagogical course entitling to perform the function of an instructor of practical job training may be conducted only based on the curriculum approved by a competent regional education authority. Pursuant to § 10 section 4 of the Regulation of 15 December 2010, at least 70 hours of psychological, pedagogical and methodical classes and 10 hours of methodical practice should be planned. A course organiser establishes the way of its organisation.

Prerequisites for participants: pursuant to the requirements defined in § 10 section 4 and 5 of the Regulation of the Minister of National Education concerning the practical job training, a participant should have at least the title of master in an occupation it shall teach or in an occupation composing the occupation that it shall teach, and teaching credentials required from teachers or a completed pedagogical course, the curriculum of which has been approved by a regional education authority and includes in total at least 70 hours of psychological, pedagogical and methodical classes and 10 hours of methodical practice, or a pedagogical course completed until 6 January 1993 entitling to perform the function of an instructor of practical job training. Instructors without the title of master craftsman in an occupation should have teaching credentials and:

- a leaving certificate from a secondary technical school, supplementary secondary technical school or an equivalent school, or a leaving certificate from a post-secondary non-tertiary school, or a leaving certificate from a college or a post-secondary non-tertiary school and a degree in an occupation related to an occupation they shall teach and at least three-year experience in an occupation they shall teach, or

- a leaving certificate from a vocational secondary school and a degree of a skilled labourer or equivalent in an occupation they shall teach and at least four-year experience in this occupation acquired after obtaining a degree, or
- a leaving certificate from a general secondary school, technical secondary school, specialised secondary school, supplementary general secondary school, secondary technical school and supplementary secondary technical school, educating in a different occupation than the one they shall teach, or a secondary vocational school and a degree of a skilled labourer or equivalent in an occupation they shall teach and at least six-year experience in this occupation acquired after obtaining a degree, or
- a diploma of the major (specialisation) corresponding with an occupation they shall teach and at least three-year experience in this occupation or a diploma of another major (specialisation) and at least six-year experience in an occupation they shall teach.

Competent regional education authority exercises a pedagogical supervision on pedagogical courses for the instructors of practical job training.

As a result of the course completion, students will acquire pedagogical:

1) knowledge of:

- labour law, health and safety regulations and other legal acts concerning the teaching profession, as well as obtaining and completing by the participants general knowledge, skills and professional qualifications within outside-school forms,
- psychological and pedagogical knowledge allowing for understanding the processes of education and teaching – learning of adults,
- psycho-pedagogical and sociological aspects of the work,
- types of human interactions and their impact on professional attitudes,
- principles, methods and ways of conducting classes with the participants,
- education and training in apprenticeship,
- communication with both the classes' participants and representatives of schools,
- cooperation opportunities with the environment.

2) skills of:

- planning of teaching, educational and service work in the process of training;
- preparation of work, the plan of changes and teaching materials (modules);
- organizing practical activities of various types and forms that occur in the process of training;
- forming and developing professional skills of the participants, skills and habits, according to the principles of psychology;
- choice of methods, principles of teaching and teaching aids for a syllabus (units);
- conducting a preliminary, current and final training;
- assessing the achievements of participants in the course of educational activities;
- completing documentation of the educational activities;
- shaping the participants' motivation and the appropriate professional attitudes;
- creating conditions for health and safety, environmental and ergonomic;
- follow-up activities within the framework of pedagogical practice;
- prevention and elimination of conflicts;
- an effective and constructive way to communicate and receive information;
- carrying out teaching and educational tasks;
- practical preparation to carry out the teaching and educational tasks arising from the role of an apprenticeship instructor;
- enrichment and modernization of the workshop through self-education and self-improvement.

2) Competency requirements for the courses' lecturers (educator, trainer)

Competency requirements for the profession of a lecturer (educator, trainer) are presented in the form of (table 7):

- 1) Description of the profession;
- 2) Standards of professional qualifications.
- 3) Modular training program.

3) Non-formal education – competence requirements for a trainer

In Poland, there are several commercial institutions offering the opportunity to acquire skills of a trainer. One of them is the Association of Consultants and Management Trainers MATRIK that prepared the program: Course for Management Trainers MATRIK based on the standards of training competence within the International Management Trainer Certificate in the field of training, learning and MATRIK⁶ development.

During the classes, materials created in collaboration with consultants and trainers from the UK that have been tested and adapted to Polish conditions are used.

The Management Trainers College MATRIK management consists of 6 training modules, in which competencies are developed at three levels: knowledge, skills and attitudes (Table 3.7).

The training lasts for 160 hours.

Another example is a school for trainers administered by Wsztechnica UJ⁷ developed the Competence Profile of a Trainer of Wsztechnica UJ with the assignment of skills together with the Training Competence Certificate to the particular EQF (acquisition of the certificate confirming the level of training qualifications to diagnose the current level of knowledge and skills in conducting training). In addition, professional standards developed by the Polish Chamber of Training Companies (<http://www.pifs.org.pl/strona/nasza-izba.html>) together with the development of the Best Practice Code (BPC)⁸ are based on the standards of the profession. However, in none of the mentioned documents there is a unified and coherent legal and organisational system, definition of the principles of conducting the training, in particular for trainers in the construction sector, as well as the requirements for persons who conduct it.

Table 3.7. Comparative analysis of the competence requirements for lecturers (educator, trainer) and the training program for one of training schools

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
Source of information				
	The classification of professions and specialties for the needs of the labour market	Qualifications standard for the profession lecturer at courses (educator, trainer), Warsaw 2003		
Identification data				
Code	235915	235910 (currently 235915)	235102 235910 (currently 235915) 311105	
Name of profession	Lecturer at courses (educator, trainer)	Lecturer at courses (educator, trener)	Teacher/instructor Lecturer at courses (educator, trainer) Teacher/apprenticeship instructor	Management trainer
Job description				
Synthesis	Organizes and conducts different forms of training and courses for various professional groups, is	Lecturer at the courses (educator, trainer) can perform and supervise professional tasks related to the support of adults		

⁶ <http://www.matrik.pl/szkola-matrik/szkola-trenerow-zarzadzania>, access: 20.12.2016.

⁷ http://www.wsztechnica.uj.pl/_public/temp/Zalaczniki/ProfilkompetencyjnytrenaeraWsztechnicyUJ_2014.pdf, dostęp: 20.12.2016.

⁸ <http://www.pifs.org.pl/strona/nasza-izba.html>, access: 20.12.2016.

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
	involved in the coordination of activities relating to the preparation, evaluation and providing students with methodological materials and teaching aids.	in lifelong learning. Due to the nature of the profession and area of operation, a lecturer is a theoretically trained specialist having practical experience in the field he teaches. Theoretical knowledge and practical experience relevant to the subject of the lecturer's course should be properly documented		
Job description		Lecturer at the courses (educator, trainer) can lead educational activities within training for different profession and age groups in various types of institutions. Forms of training can be dedicated to gaining qualifications, professional development or covering universal needs, aspirations and ambitions of trainees (psychotherapeutic training, driving license courses, art history courses). A lecturer may conduct single classes or conduct classes that are part of a larger project. Moreover, being familiar with specific fields, a lecturer may: examine, give advice and consultation, participate in the coordination of activities relating to the preparation, evaluation and distributing among listeners (adult learners) methodological materials and teaching aids, supporting both learning in a group and self-education process.	Teachers of this group conduct teaching activities, participate in the development of teaching materials, professional and teaching aids, as well as in developing, updating and evaluation of curricula. Adjust the content of education to the requirements of workplaces, plan the teaching process, organize jobs for students, and evaluate the effectiveness of training. They specialize in the development, implementation and evaluation of modular training for the labour market using the methodology of Professional Competence Modules(CPC. MES) developed by the International Labour Organisation (ang. ILO) and adapted to the conditions of Polish Ministry of Economy, Labour and Social Policy (MELSP). Within activities of teaching and training, lecturers apply principles related to adult learning, active methods of teaching and learning procedures and tools for evaluation of teaching. In the creation of educational opportunities, they use the analysis of training needs, participate in the development of new and modify existing modular training programs, they choose the materials and equipment necessary for carrying out activities in a modular system considering the expectations of individual and group clients.	
Work environment		A lecturer's work within courses is usually individual. Sometimes, however, they can work in pairs or as a team.	Working conditions: <ol style="list-style-type: none"> 1. Works in training centers providing services for the improvement, further education, training, professional requalification of workers and the unemployed, in accordance with the general and internal provisions. 2. Usually works in the studios adapted for the implementation of syllabus (classrooms, lecture halls, laboratories, including simulation laboratories), production halls, outdoor (polygons) in accordance with applicable labour laws, safety and environmental protection. 3. He may operate on its own account in accordance with 	

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
			<p>the provisions of the Act of business and copyright law.</p> <p>4. He contacts students / learners according to their needs in accordance with established rules.</p> <p>5. He contacts customers (internal – other employees) and external (clients, including labour offices) directly or via e-mail while maintaining professional ethics and respect for other people and their respective competences.</p> <p>6. Works in time depending on the needs of the training organizer.</p>	
Psychophysical and health requirements		<p>A lecturer's work at the courses requires constant and direct contact with the audience. An indispensable feature is the ease of speaking and writing. The ability to concentrate attention and at the same time its divisibility, precision and consistency of expression are also important.</p> <p>Working with a large group of people, often in different technical conditions, requires patience and skills to quickly adapt to the new situation.</p> <p>The nature of work also requires:</p> <ul style="list-style-type: none"> – A high emotional resilience. – The ability to harmoniously interact with others. – High degree of autonomy in planning activities. – Consistency in the implementation of the tasks planned. – The ability to plan and organize one's own work. 		
Education and permissions			<ul style="list-style-type: none"> – Higher education, in certain cases, governed by the relevant provisions, may hold – a secondary education (e.g. classes within basic vocational courses). – Knowledge of industry regulations, depending on the specialty and type of course. – Health condition, in order to carry out the profession, confirmed by a medical certificate. <p>Additional requirements:</p> <ul style="list-style-type: none"> – The professional training in accordance with applicable regulations. – Practice in a particular professional field. – Knowledge of computer and basic office software. – Knowledge of English at least at a basic level. – Certificates of training 	

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
			undertaken within the framework of professional development, copyright programs and training materials. – Ease to express oneself.	
Possibility of professional development				
Additional tasks	<ul style="list-style-type: none"> – Conducting direct teaching activities during specialized courses organized by various training institutions; – Organizing training courses, talks, consultations with students in the field of specialization and represented by fixed individual needs for different professional groups; – Activities connected with a widely accepted professional orientation in their field, developing guides, informants. – Gathering and disseminating various types of information, educational, professional and organizational among environments interested in educational issues. – Collecting, preparing and providing students with teaching materials and substantive and teaching aids. – Participation in committees program committees developing and updating program documentation. – Interaction with the authors of textbooks and units preparing teaching aids, videos and other methodological materials. – Developing ideas and proposals of educational courses and improvement of teaching and educational work in institutions organizing the training activities. – Organizing and conducting research on the suitability of curricula, textbooks and other teaching aids. – Organizing and conducting research on the effectiveness of training and learning outcomes. – Participation in seminars and 	<ul style="list-style-type: none"> Z-1. Conducting the diagnose of training needs at different levels (local, businesses, individuals). Z-2. Preparing a scenario of training classes. Z-3. Conducting a lecture presenting knowledge and expertise. Z-4. Preparing and conducting exercises to shape and / or improve the skills of training participants. Z-5. Conducting the diagnose to assess the progress of course participants and to inform about the results. Z-6. Managing the group process during the classes. Z-7. Developing course materials, methodology and teaching aids to support the process of teaching-learning. Z-8. Designing a training program. Z-9. Preparing the training offer. Z-10. The preparation of financial plans of training courses. Z-11. Organizing and managing one's own training work. Z-12. Preparing a room and a practice position to carry out activities. Z-13. Participation in the organization of seminars, specialized and methodology conferences. Z-14. Conducting the course. Z-15. Practical and methodical cooperation with other teachers. Z-16. Cooperation with authors of textbooks and teaching aids. Z-17. Managing an organizational unit that provides training services. Z-18. Conducting evaluation of their work. Z-19. Conducting evaluation work of other teachers (class inspections, observations, supervisions). Z-20. Training evaluation, including performance tests, i.e. the achievement of aims. Z-21. Conducting research on the suitability of curricula, textbooks and teaching aids. 	<p>Note: according to the MES methodology, it was assumed that a modular unit, module = a vocational task</p> <ul style="list-style-type: none"> JM.01. Identification and analysis of training needs JM.02. Designing a modular training program JM.03. The use of activating teaching methods in teaching and training activities JM.04. Organization of modular vocational training in practice JM.05. Creating educational packages and the selection and adaptation of training materials JM.06. Monitoring and evaluation of modular vocational training JM.07. Preparation of tenders and implementation of modular training with special reference to adult education 	<p>Note: according to the MES methodology, it was assumed that a modular unit, module = a vocational task</p> <ul style="list-style-type: none"> Module I. Identification and analysis of training needs, contact with a customer Module II – Training design Module III – Evaluation of training Module IV – Trainings Module V – Professional Development of a Trainer Module VI – Training studies

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
	conferences in the field of education. – May act as a manager of the course.			
Professional competences		Components of professional qualifications K-1. Preparation and implementation of activities (lectures, workshops, training, exercises, demonstrations) during the course. K-2. Assessment and examination of students. K-3. Designing the course. K-4. Evaluation of training services. K-5. Conducting the course. K-6. Managing an organizational unit (team, workshop, training facility) providing training services.		
Relations between professional competence and the level of qualifications in the EQF / PQF				
Description of learning outputs				
Knowledge		Additional Professional qualifications – Techniques of communication. – Techniques of obtaining and processing information. – The principles of ergonomics, safety regulations, fire and environmental protection. – The rules of social coexistence. – Selected issues of labor law. – Principles of pleadings preparation, filing documents, conducting calculations. – Methods of solving problems. – Principles of first aid. – Principles of work organization. – Principles of effective management. General professional qualifications: – Principles of preparation and giving a presentation. – Health and Safety and fire regulations – general and within the area associated with the issues discussed during classes. – Rules for the drafting of texts (textbooks, teaching texts). – Taxonomies for educational purposes. – Rules of examination and assessment of listeners. – Characteristics of optimal means of teaching. – Self-knowledge about one's own styles– social, learning, leading others, preferred roles in the team. – Voice techniques and their significance. – Relaxation techniques. – The principles of ergonomics. – Rules of communication	JM.01. Identification and analysis of training needs After the modular unit, a trainee will be able to: – Define the general assumptions, the purpose and principles of identification and analysis of training needs. – Plan the time and scope of the analysis and identification of training needs. – Obtain, from various sources, the information necessary to comply with IPS (including the labor market, standard of professional qualifications). – Distinguish and choose the methods of obtaining information depending on the group for which the identification is carried out, – Select, construct and apply the basic tools for the identification of training needs (institution, employee, an unemployed person). – Identify training needs, develop and analyze the results. JM.02. Designing a modular training program After the modular unit, a trainee will be able to: – Explain the nature of modular training modules based on the concept of Professional Competence (CPC. MES) developed by the International Labour Organisation. – Characterize the structure and elements of the documentation of a modular training program using available sources of literature and training materials. – Identify the professional tasks	Module 1. At the level of knowledge, a participant: – Will learn about the methods of carrying out the identification and analysis of an organization, – Will learn about competence and the role of professional consultant, – Will learn about tools for the identification and analysis of the organization at different levels and in different areas of its functioning, – Will learn about the structure of a properly worded report, – Will learn about the basic sources of information. Module II. At the level of knowledge, a participant: – Will learn about principles of adult learning and their impact on planning the training. – Will learn about an experimental model of learning by david a. Kolb. – Will determine his own learning profile according to david a. Kolb. – Will get acquainted with the specifications of the objectives according to the smart method. – Will learn and select appropriate training methods for specific

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
		<p>between people.</p> <ul style="list-style-type: none"> – Ways of dealing with conflicts. <p>Basic qualifications for the profession:</p> <ul style="list-style-type: none"> – Current, general and specialized knowledge that is part of the training (K-1). – General, psychological knowledge (K-1). – Principles of teaching (teaching) (K-1). – Principles of didactic design(K-1). – Theoretical and practical teaching methods (K-1). – Andragogy (principles of adult learning) (K-1). – Modern technical means of teaching (K-1). – Psychological aspects of teaching assessment (K-1, K-2, K-4). – Critical analysis of information (K-1). – Stages of group development dynamics (K-1). – Ways to cope with a difficult participant of a training (K-1). – Negotiation techniques (K-1). – Principles of creating substantive and methodological materials and teaching aids (K-1). – Place of evaluation in the management of one's own development (K-1). – Principles of giving feedback (K-1, K-2, K-4). <p>Specialist qualifications for the profession:</p> <ul style="list-style-type: none"> – Basic principles of social research methodology (educational) (K-2, K-4). – Methods and tools for collecting qualitative and quantitative data (K-2, K-4). – Quantitative and qualitative analysis of data (K-2, K-4). – Methods for preparation and presentation of results (K-2, K-4). – Principles and methods of measurement of teaching (K-2, K-4). – Regulations specifying the authorization of the use of teaching materials (K-1, K-3, K-5). 	<p>based on the analysis of work and formulate a job description according to the adopted model.</p> <ul style="list-style-type: none"> – Extract the accepted range of modular units and give their description, in accordance with the adopted model. – Make a block diagram of modular units for an example scope of work and define the system of correlation. – Formulate training objectives for a modular unit according to the adopted model. – Carry out the operationalization of exemplary vocational training purposes, taking into account: actions, conditions of the activities implementation, and the standard or criterion of activities performance. – Extract the training units for a sample modular unit including work analysis requirements and in accordance with the adopted standard. – Prepare a sample description for a training unit according to the adopted model. – Design a progress test and performance test (exam test), using examples proven within practice in modular training. – Formulate a list of teaching equipment for the implementation of activities in a sample modular unit, according to the adopted model. – Prepare selected elements of a methodological guide for students and teachers / instructors, using accessible models. – Use the existing documentation of modular vocational training, developed within the project TOR # 9 – Adult Training. <p>JM.03. The use of activating teaching methods in teaching and training activities After the modular unit, a trainee will be able to:</p> <ul style="list-style-type: none"> – Classify and distinguish the characteristics of teaching methods with a focus on the method preferred in the realization of modular training. – Analyze a teacher's / instructor's learning style together with an indication of its advantages and disadvantages. – Define the role of a trainer to motivate participants to actively participate in learning activities. – Use the metaplan method during teaching – presenting discussion in a graphic form (poster). – Use within teaching and 	<p>training objectives.</p> <ul style="list-style-type: none"> – Calculate a variety of methods and forms of training. – Will learn about the principles of training design according to a model proposed. <p>Module III: At the level of knowledge, a participant:</p> <ul style="list-style-type: none"> – Terms used in the evaluation process. – It will analyze models and different levels of assessment training. – Evaluation tools used for training at every level of the assessment. – Read the rules to create a report and recommendations to the client. <p>Module IV: At the level of knowledge, a participant:</p> <ul style="list-style-type: none"> – Will gain the knowledge of the nature and components of the group process. – Will deepen understanding of the training as the substantive content of interaction and group process. – Will learn about techniques for coping with stress in situations of public speaking. – Will determine the basic steps to prepare a trainer for a training. – Will gain knowledge about himself and his preferred ways of resolving conflicts and difficult situation in the training room via disc. – Will gain the knowledge of the nature and components of the group process. – Will deepen understanding of the training as the substantive content of interaction and group process. – Will learn the ways of dealing with the so-called difficult situations within training work. <p>Module V At the level of attitude, a participant will:</p> <ul style="list-style-type: none"> – Rethink how effectively support the development of others and how effectively direct his own

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
			<p>training work some elements of practical classes, using the method of projects and guiding text.</p> <ul style="list-style-type: none"> – Use of information technology in organizing teacher /Instructor workshop. <p>JM.04. Organization of modular vocational training in practice After the modular unit, a trainee will be able to:</p> <ul style="list-style-type: none"> – Present the manner of coordination, procedures and documentation used in the organization of modular training for the labor market. – indicate the possibility of the use of modular programs for vocational training, within the implementation of employment and human resources development. – present the technological infrastructure and discuss issues related to the organization of the training base for the implementation of modular programs. – describe ways to improve the competencies of teaching and management staff for the implementation of modular training programs. – observe training activities carried out with the use of modular curricula and educational packages. – identify the strengths and weaknesses of the organization of training in a modular system, based on an analysis. 	<p>development.</p> <ul style="list-style-type: none"> – Realize how he can increase his influence on the development of the people with whom he works as a trainer, consultant and coach. – Rethink what he may introduce into his workshop in order to help others develop their professional competence. – Rethink how to improve the work of people in groups with different needs, interests and attitudes. – Realize the importance – other than training – of being a coach. – Realize the role of self-reflection and reflection in supporting the development of oneself and others. – Build self-motivation for further development. <p>Module VI At the level of knowledge, a participant:</p> <ul style="list-style-type: none"> – Will learn about various forms and methods of providing feedback.
Umiejętności		<p>Additional professional qualifications:</p> <ul style="list-style-type: none"> – Communicates effectively. – Searches and processes information. – Uses information technology (including the use of information resources on the Internet, uses e-mails, a word processor, spreadsheet and databases). – Organizes workplace according to ergonomic principles, safety, labour protection and environment regulations. – Adheres to the principles of social coexistence. – Behaves ethically. – Distinguishes and respects the basic rights of employers and employees. – Solves problems and makes decisions in terms of his powers. – Performs basic calculations. – Creates and conducts systematic documentation of work. – Develops professionally, plans and implements his own career path. – Performs self-esteem. – Copes with stress. – Adjusts to changes. – Provides first aid. – Initiates the introduction of technical and organizational solutions that improve the conditions and quality of work. 	<p>JM.05. Creating educational packages and the selection and adaptation of training materials After the modular unit, a trainee will be able to:</p> <ul style="list-style-type: none"> – Choose the types of materials and teaching aids required for the training classes and meet the expectations of MES methodology. – Create the structure of materials and curriculum for the training module in accordance with the needs of modular training. – Choose the structure and content of the handbook prepared for listeners and instructors with the principles of communication and individual training. – Determine the structure of a guide for students and instructors, which guides the exercises performed. – Gather the training materials in the form of an educational package for a chosen subject teaching. – Choose teaching methods and techniques of information transfer, adequate to the content submitted. – Submit proposals for assessment criteria of the 	<p>Module I. At the level of skills, a participant:</p> <ul style="list-style-type: none"> – Will identify organizational needs. – Will choose and apply the most appropriate methods and techniques to identify and analyse organization. – Will learn to design tools for identification. <p>Module II. At the level of skills, a participant will:</p> <ul style="list-style-type: none"> – Determine training objectives and define them for each training session. – Develop an overall training plan. – select appropriate training methods to achieve the objectives. – Design two training sessions in detail, taking into account the logistics of training for a group of 12 people. <p>Module III: At the level of skills, a participant will:</p> <ul style="list-style-type: none"> – Improve the ability to construct and use of evaluation sheets and other evaluation tools. – Train the elements of preparation and presentation of

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
		<ul style="list-style-type: none"> - Distinguishes between tasks performed by individual organizational units. - Manages people effectively. - Manages budget economically. <p>General vocational qualifications:</p> <ul style="list-style-type: none"> - Applies rules correctly, prepares and carries out presentations within the general and specialized knowledge. - Uses correct professional and didactic terminology. - Uses audio-visual aids in order to conduct a lecture. - Properly supports the teaching aids necessary to conduct the exercise. - Uses a computer for the preparation of text materials, graphics and presentations using specialized programs. - Plans his own actions. - Uses various sources of information. - Organizes and classifies information from the point of view of their suitability for the objective completion. - Clearly formulates and communicates his expectations. - Conducts negotiations successfully. - Constructively reacts to changes. - Performs evaluation of his work. - Uses the evaluation conclusions to improve his work and plan his own development. <p>Basic qualifications for the profession</p> <ul style="list-style-type: none"> - Formulates training goals based on his knowledge of the subject(K-1, K-3). - Develops classes' scenarios (K-1). - Assesses the suitability of content for participants and makes the appropriate selection according to expectations and perception capabilities of recipients (K-1, K-4). - Selects the methods of guiding the activities to suit the purpose and the level of participants (K-1, K-3). - Selects forms of teaching taking into account the organizational framework, institutional and financial (K-1, K-3). - Selects teaching aids suitable for purpose and perceptive abilities of participants (K-1, K-3). - Introduces activities effectively during the period for their implementation (K-1). 	<p>results of student training, resulting from the need to determine the level of skills in the module.</p> <p>JM.06. Monitoring and evaluation of modular vocational training After the modular unit, a trainee will be able to:</p> <ul style="list-style-type: none"> - Explain the essence of evaluation with a focus on carrying out the assessment and evaluation activities of an educational training. - undertake the evaluation before the process of modular training, during the training and after the training, using questionnaires. - Analyze data obtained during the evaluation processes and draw conclusions enabling the improvement of the modular programs quality, materials and training methods. - Assess the quality of a modular training program at the pre-implementation stage, including self-evaluation and external evaluation. - Keep records necessary to monitor the implementation of a modular training conducted. - Prepare a report on the implementation of a modular training in accordance with the pattern established by the MGPIPS. <p>JM.07. Preparation of tenders and implementation of modular training with special reference to adult education After the modular unit, a trainee will be able to:</p> <ul style="list-style-type: none"> - Characterise principles related to adult learning in line with scientific basis of andragogy. - Identify the factors hindering (blocking) and facilitating adult learning, including the results of research in psychology, sociology, medicine and work pedagogy. - Use professional and life experience of candidates for training during formulation of individual training programs in the modular convention. - Develop a training offer for the implementation of modular vocational training programs in accordance with the requirements of the labor market (local, national). - Prepare information materials (Leaflet, folder) for the promotion of modular training programs offered by the institution. - Provide information on educational services offered by the modular training system for institutions and candidates interested in training. 	<p>evaluation reports.</p> <ul style="list-style-type: none"> - Acquire the skills to use the evaluation results in order to modify the course of the next training. <p>Module IV: At the level of skills, a participant will:</p> <ul style="list-style-type: none"> - Improve communication skills as trainer's basic tools. - Acquire skills of adequate use of various forms of working with groups. - Improve the ways of responding to difficult training situations as a result of applied research using the disc tool. - Improve communication skills as a trainer's basic tools. - Acquire the skills to respond adequately to situations that occur during training. - Acquire the skills of conscious influence on the group process. <p>Module V At the level of SKILLS, a participant will:</p> <ul style="list-style-type: none"> - Practise ways of analyzing resources, needs, risks and opportunities associated with defining purposes of professional development. - Practise various methods to formulate and verify development goals focused on increasing motivation to achieve the objectives. - Practise preparation of an individual development plan based on a selected personal objective of professional development, using a variety of plan forms. - Practise listening skills at different levels. - Practise formulating strong questions to intervene in a variety of situations, group work and individual work. - Practise matching the development methods to the individual needs of employees. - Practise collecting information from different perspectives and decision making with regard to the diversity of positions and interests.

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
		<ul style="list-style-type: none"> - Learns about the interest of the students (K-1). - Prepares the optimum space to carry out exercises (K-1). - Conducts training using alternative methods chosen for the purpose and capabilities of participants and the hardware while maintaining safety and fire regulations. (Q-1). - Determines optimal space for classes (K-3). - Provides feedback for the participants on the learning effects (K-1, K-2, K-4). - Effectively manages the group process at every stage of the group development (K-1). - Deals with conflict situations without harm to the group and learning process (K-1). - Develops substantive and methodical materials in accordance with the methodology of creating materials to support education and self-education (K-1, K-3). - Responds flexibly to changes within the demand for specific education forms (K-1). - Gathers feedback from trainees on the classes efficiency (achieving the objectives) (K-4). <p>Specialist qualifications for the profession:</p> <ul style="list-style-type: none"> - Designs training according to recognized needs (K-3). - Defines personal and material requirements necessary to achieve the objectives of the training (K-3). - Create a training schedule according to the didactic rules of (K-3).- Designs and uses teaching aids in accordance with the principles of teaching (K-1). - Organizes optimal space to teach in the form of activities (K-1). - Prepares space for exercises to ensure the optimum conditions for participants' learning process (K-1). - Plans and develops tests to diagnose training needs (K-1, K-4). - Measures the knowledge and skills covered within the training topics (K-2, K-4). - Writes the study report (K-1, K-2, K-4). - Prepares sets of examination tasks (K-2). - Presides an examination team (K-2). 		<ul style="list-style-type: none"> - Practise ways of staring self-reflection and reflection in others. <p>Module VI At the level of skills, a participant will:</p> <ul style="list-style-type: none"> - Learn how to provide developmental feedback. - Practise and will learn how to take developmental feedback. - Directly use the knowledge and skills gained during methodical modules, and above all in the field of training for the strictly practical tasks.
Attitudes		<ul style="list-style-type: none"> - Communication skills. - Willingness to learn and update ones knowledge. - Ability to think logically. - Concentration and divided 		<p>Module I: At the level of attitudes, a participant will:</p> <ul style="list-style-type: none"> - Realize the significance of properly conducted

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
		<p>attention.</p> <ul style="list-style-type: none"> - Suitability to work in a team. - Imagination and creative thinking (creativity). - Flexibility in action. - Openness to new experiences and people. - Independence. - Responsibility. - Emotional resistance. - Ability to work under stress. - Ability to make quick and accurate decisions. - The ability to persuade others. - Tolerance, respect for others, patience, kindness. - Ability to accept oneself and identify with one's own action. - Sense of humour. - Imagination and creative thinking abilities. - Emotional resistance. - Demonstrating self-control. - Demonstrating independence. - The ability to connect with people. - The ability to empathize. - Ability to make quick and accurate decisions. - Ability to cooperate. - Leadership abilities. 		<p>identification and analysis of organization.</p> <ul style="list-style-type: none"> - Understand the importance of the identification and analysis in the context of its efficiency and the need for in-depth analysis of symptoms in order to know the causes and formulate valuable recommendations. <p>Module II: At the level of attitudes, a participant will:</p> <ul style="list-style-type: none"> - Understand the importance of correct and accurate determination of training objectives. - Be aware of the importance of the training scenario preparation with forms of work indicated. <p>Module III: At the level of attitudes, a participant will:</p> <ul style="list-style-type: none"> - Identify his own areas for further development of competence within the use of tools for the evaluation of training and comprehensive training projects at four educational levels. <p>Module IV: At the level of attitudes, a participant:</p> <ul style="list-style-type: none"> - Realizes the importance of the group process in the context of the training objectives. - Realizes the role of adequate responding to situations during training in the context of the training objectives. <p>Module V: At the level of attitudes, a participant will:</p> <ul style="list-style-type: none"> - Rethink how effectively he supports the development of others and how effectively directs his own development. - Realize how he can increase his influence on the development of people with whom he works as a trainer, consultant and coach. - Rethink what he can introduce into his workshop in order to help others develop their professional competence. - Rethink how to improve the work of people in groups with different needs, interests and

	The requirements of the labour market		Non-formal education	
	Job description	Professional qualifications standard	The modular training program	The management trainers school's program MATRIK
				attitudes. <ul style="list-style-type: none"> – Realizes the importance – other than training – of a trainer's role. – Realize the role of self-reflection and reflection in supporting the development of self and others. – Build self-motivation for further development. Module VI: At the level of attitudes, a participant will: <ul style="list-style-type: none"> – Increase his awareness of the diversity of methods used in the design and conducting a training. – Increase his awareness of the limitations of each method.

Summary Poland

In Poland, the profession of a trainer is not regulated in a sufficient way. The profession similar to the tasks performed by the trainer is a lecturer at courses (educator, trainer, code: 235915). In the construction sector, there is a noticeable lack of PV trainers, who not only pass on knowledge, but also skilfully affect the change in training participants' attitudes and help them acquire new skills.

The EU-PV Trainer project responds to organizational or substantive difficulties faced by vocational schools, training centres and practical education centres. European policy on vocational education and training (VET) makes a strong link between the quality of education and the quality of teachers and trainers. Teaching staff are important stakeholders in implementing current VET reforms, and their training and professional development are crucial elements in ensuring quality⁹.

Teachers and trainers will play a decisive and strategic role in the implementation of the goals set up by the EU.

An increasing number of non-public training services, as well as the necessity of fighting with unemployment through the provision of a job opportunity after retraining or as a result of extending the already acquired professional entitlement, show a deficit of experienced trainers on the labour market. *"In the profession of a trainer, predispositions are important. However, you have to learn this profession and – moreover – improve it all the time at persons who are better than you, that is at "trainers". Certificates confirming the trainer's competence require long-term learning and continuous improvement. In this industry, only the best ones can count on the most profitable contracts"*¹⁰.

There are several institutions that have tried to adjust the EQF standards to the domestic training market, e.g. Wszechnica UJ¹¹ developed the Competence Profile of a Trainer of Wszechnica UJ with the assignment of skills together with the Training Competence Certificate to the particular EQF (acquisition of the certificate confirming the level of training qualifications to diagnose the current level of knowledge and skills in conducting training). In addition, professional standards developed by the Polish Chamber of Training Companies together with the development of the Best Practice

⁹ Exploring leadership in vocational education and training, CEDEFOP, Publications Office of the European Union, Luxemburg 2011.

¹⁰ Jak się wyszkolić, by szkolić innych. Wprowadzenie w problematykę zawodu trenera. Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2009.

¹¹ <http://www.wszechnica.uj.pl/>, access 20.12.2016.

Code (BPC)¹² are based on the standards of the profession. However, in none of the mentioned documents there is a unified and coherent legal and organisational system, definition of the principles of conducting the training, in particular for trainers in the construction sector, as well as the requirements for persons who conduct it.

This fact confirms the EU-PV Trainer project partnership's opinion on the validity of the project task completion. The lack of the analysis of training needs or training programs for the PV trainers in the construction sector provides an opportunity to fill the gap in the training services on the extracurricular educational service market through the separation of such a profession and its introduction to the classification of professions and professional specialities.

The labour market verifies the qualifications of trainers. An increasing competition in this area (in Poland more than 10 thousand persons work as trainers) impacts the continuous improvement of skills and adjustment of education to the needs of the labour market. However, there is no legal framework for the profession of a PV trainer in the construction sector.

The training program includes a description of the terms and conditions of participation, training schedule, however there is no information on the PV trainers' competence. It is important to establish the legal framework for the profession of a PV trainer in the construction sector.

It should be justified to compare the trainers' competence acquired in various countries based on the European Qualifications Framework (EQF). Education systems in particular countries differ from each other and eight levels of EQF help with the identification of knowledge, competence and skills acquired by a given person on each level. The partnership agreed that a trainer in the project should be at least on the 4/5 level of EQF¹³.

Therefore, a trainer should demonstrate at least *“factual and theoretical knowledge in broad contexts within a field of work or study”* and/or *“comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge”*, having at its disposal at least *“a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study”* or *“a comprehensive range of (...) skills required to develop creative solutions to abstract problems”*. A trainer should also demonstrate the sufficient competence e.g. to *“supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities”* and to *“exercise management and supervision in contexts of work or study activities where there is unpredictable change”* and to *“review and develop performance of self and others”*.

3.2. Romania

The aim of this Report is to identify and describe the core competence requirements in Romania for a VET trainer/teacher in the domain photovoltaic systems installation.

The report provides a summary of findings of Partner 3 – UDJG Romania, as a specific research identified as part of O1-A1 Intellectual Output activity in EU-PV-Trainer project.

3.2.1. Standards and regulatory bodies in Romanian NQF

The National Qualifications Framework (NQF) of Romania is built upon three main pillars: the standards of qualification, the state institutions/agencies having the role of regulatory authorities, and – the most important ones – the state and private educational entities.

Among the most important standards in the Romanian NQF are the following:

1. The National Classification of Occupations standard (NCO).
2. The National Qualification Standards (NQS).

¹² <http://www.pifs.org.pl/strona/nasza-izba.html>, access: 20.12.2016.

¹³ Zalecenie Parlamentu Europejskiego i Rady z dnia 23 kwietnia 2008 r. w sprawie ustanowienia *Europejskich Ram Kwalifikacji dla Ucznia się przez całe życie*.

First standard, the National Classification of Occupations – NCO, (shortly called named CO – Classification of Occupations, or "COR" in Romanian) is the exhaustive, systematized list of the occupations (jobs, professions) officially recognized in Romania.

The NCO standard is consistent with the international standard classification of occupation (ISCO 88) and contains the list of all the professions (occupations, jobs) related to the activity domains existing in Romania.

The NCO list is organized as a **nested hierarchy**, or a "tree". It also contains a brief description of the features specific to any occupation/profession: tasks and responsibilities, context of work, knowledge, skills and competences necessary to practice that profession.

The institution responsible with development and maintenance of the NCO standard is the Romanian Ministry of Labour. After the country's accession to the EU, the Ministry of Labour carried out several campaigns with aim to align the Romanian occupational standards to the European Community's ones.

The NCO standard list of occupations can be found at the address:

http://www.mmuncii.ro/j33/images/Documente/Munca/COR/2015-03-26_ISCO_08_COR_lista_alfabetica.pdf

The second standard, the National Qualification Standards – NQS, (shortly named QS or SC in Romanian) provides principles, descriptions, prescriptions and the necessary conditions to acquire a certified qualification in a profession (occupation) listed in NCO.

The National Qualification Standards are maintained in Romania by the institution responsible for any qualification definition and validation/certification model, that is, the **National Qualification Authority – NQA, (called ANC in Romanian)**, <http://www.anc.edu.ro>

NQA is a public entity functioning as an agency under the coordination of the Romanian Ministry of Education. The NQA agency main role is to support those structures of the NQF meant to provide educational activities, in all forms: formal and non-formal/informal, as well as continuous training/lifelong learning. Thereby, the NQA overall aim is to sustain development and competitiveness of human resources in Romania.

NQA is in addition the Romanian institution maintaining the **National Register of Qualifications**, a standard which contains the description of the corresponding qualification model of each occupation existing in NCO.

Some of the NQA most important duties and activities are the following:

- to develop and implement national or international educational programs and projects,
- to create/maintain specifications for development and validation of qualifications,
- to develop criteria and procedures for certification of professional competence evaluators,
- to verify and validate the occupational standards (standards describing a job),
- to perform accreditation and certification of Assessment Bodies or Evaluation Centres,
- to ensure consistency and compatibility of the NQF with other systems as EQF,
- to ensure the quality assessment in continuing vocational training, including development, in collaboration with sectorial companies, of the necessary methodologies and procedures,
- to ensure the legal framework in for adults training programs,
- to coordinate quality assurance in continuing vocational training,
- to coordinate, monitor and controls the licensing and authorization of adult education and training providers.

From the list of its activities and responsibilities, the National Qualification Authority – NQA, most important, core tasks, remain:

- to verify, to validate and to promote new occupational standards (standards defining a new occupation, job or profession),
- to authorize training Centres for continuing educations of adults.

As a result, the National Qualification Authority – NQA, include and supervise the **National Accreditation Centre (NAC)** the legal body designed to authorize, evaluate and audit the vocational education or continuous education training centres/bodies throughout the entire country of Romania.

3.2.2. Introduction of a new Occupational/Qualification Standard into the Romanian NQF

Introduction of **a new qualification standard** implies the Romanian NQA (National Qualification Authority). It can be done through the following steps:

1. An independent organization (usually an authorized training provider/centre) requests from NQA methodological assistance in order to develop **a new occupational standard**.

The new occupational standard must be consistent with the National Classification of Occupations standard of Romania (NCO).

2. This independent organization proposes "a Project", which is in fact a model for the new occupational standard and/or the corresponding qualification standard.

The project will describe the professional skills and competences necessary to be acquired by the person's wishing to practice a job belonging to the new occupation.

Usually, the organization also describes the national-wide recognised Qualification Certificate that will be obtained after completion of a training course for that occupation.

The Certificate will specify the name of the new occupation and will be accompanied by a Qualification Annex – the detailed description of the skills and competences that should be acquired in order to practice the new occupation.

3. At the next stage, the occupational/qualification standard will be proposed for validation to the sectorial committees or regulatory entity in the area (if there are any).

4. After validation of the occupational/qualification standard by the sectorial committees, the Project is going to be approved by the NQA.

5. After the NQA the approval of the new occupational standard, it is considered a national standard and it is made public.

The standard becomes mandatory for all training providers proposing qualification courses for that occupation. In case of renewing an existing occupational standard, training providers have to review their corresponding training programs in order to make them in line with the new provisions of the occupational standard, within 30 days of its publication by NQA.

The Authorized Training Centres specialized in adult/continuous education which propose a new training course for a qualification, has to prove that it has authorized specialized trainers for the upcoming programme.

In addition, the Centre is required to prepare the Annex of Qualification Certificate containing the list of competencies and skills from the national occupational standard, the upcoming program will target through training.

A person following a course in a Training Centre wills the following qualifications proof:

- A **Professional Qualification certificate** – for vocational training programs.
- **Certificate of completion** – for skills' improvement, specialization courses, or on completion of a course module, where the training programs are structured in modules.

3.2.3. Regulatory documents for the PV Installer Trainer Occupation

The analysis over the occupations, certifications and entities able to provide theoretical or practical courses in the photovoltaic domain was based on the following documents:

1. The qualifications list for that can be organized training programmes finished with a Professional Qualification Certificated approved by Ministry of Labour, Social Solidarity and Family and the Ministry of Education, Research and Youth no. 35/3112/2004.
2. Order of the Minister of Labour and the Minister of Education no. 1062/3989 of 1 March 2011 for updating the qualifications classification and the programs that can be organized for certifications.
3. Government Decision no. 556/2011 about organization and functioning of the ANC (National Authority for Qualifications).
4. Government Decision no. 129/2000 about professional education for adult people.
5. EU directive 28/2009/CE – about "promoting the use of energy from renewable sources by Article 14, which stipulates that by the end of 2012, Member States shall ensure certification schemes or equivalent qualification for installers in renewable energy sector (small boilers and stoves and biomass systems solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps). Also, each Member State shall recognize certification awarded by other member states in accordance with criteria established by the Directive.
6. OG 29/2010 which stipulates – Annex Conditions for certification schemes relating to installers (including PV installers).

3.2.4. The Qualification of Trainer in PV Systems' Installation in Romania

The experience of the Romanian partner and the analysis of occupational standards at national level show that **in Romania there is no definition for qualifications requirements for a trainer conducting theoretical and practical training in the field of photovoltaic trainers.**

The National Classification of Occupations standard of Romania (NCO) has defined separate qualifications for trainer and photovoltaic installer. Therefore, in this section will provide:

- a description of Romanian NQF's standards for becoming a trainer in PV systems installation,
- the conditions for achieving a certification in this area,
- a comments about the training centre providing these certification.

3.2.5. Requirements for becoming a VET Trainer in Romania

In Romania, a person wishing to become a VET trainer in a specific field has to choose between two possible educational paths:

- To obtain a bachelor degree (in the national formal education system) in a field together with the a certificate of qualification in teaching; then to pass the national exam for admission as a tenure teacher in the national public system of education; in this case the person will obtain the right to teach theoretical or practical courses in VET schools.
- To obtain a certification from an **authorized accredited training provider** (in continuous education forms). The training providers are entities (companies, associations, foundations) authorized by NQA's (National Qualification Authority) as **Centres for evaluation and certification of competences of trainers**. After graduating the training courses (approved by the legal bodies of Romania) for becoming future trainers in continuous education, a person can be a VET trainer in own speciality domain.

The list in the Romanian NCO (Classification of Occupation) standard comprises only two occupations related with the PV systems (Table 3.8). However, due to the high demands coming from the labour market, some technical universities become to provide study programs related to the field of renewable energy (Table 3.9).

Table 3.8. List of professions in Romania related to the area of PV installations

Occupation code in NCO	Name of Occupation/profession/job	Level EQF
741103	Photovoltaic solar system installer	4
313113	Renewable energy systems operator	3

Table 3.9. Study programs in Romania related to the field of PV systems installation

Name of profession/occupation/job	Type of education	Duration	Level EQF
Engineering of Renewable energy systems'/ Renewable energy sources	University Formal	2 years Master degree	7
Engineering of renewable energy systems	University Formal	4 years bachelor degree	6
Photovoltaic system installation	Non-formal	6 months training course	4

The graduates of these study programs can be then enrolled as teachers in technical schools or post-secondary schools (formal education) or integrate the authorized training centres (non-formal education). In addition, some authorized training centres organize courses with international recognition for PV installers.

There are also entrepreneurs who train the future installers at work, with help of expert trainers in different proprietary technologies.

It should also be mentioned that **the industry of renewable energy experienced last years a great development in Romania**: from 2014, the country's projects for wind and solar energy will no more receive funding from the EU 2014-2020 budget, due to the fact that the renewable energy objective set for 2020 in Romania has already been achieved, (see <http://www.natureenergy.ro/>).

Becoming a trainer in the PV systems' fields is a process ruled by the same general regulations of VET education career. A person wishing to become a trainer in Photovoltaic Systems Installation (Figure 3.4), in private sector, must possess a **certificate of Trainer** issued by a NQA authorized Centre plus a **certificate** of qualification in the field of **PV systems** in which he/she will teach the courses. In this case, the career of VET teacher (for continuous, non-formal and work-place education) embraces three types of professional developments:

- **VET Trainer** – for persons possessing a bachelor/college (minimum EQF 5) – (NCO code **242401/2011** or **241205/2007**),
- **VET Instructor/Junior VET trainer** – for persons possessing a secondary scdiploma (minimum EQF 3 or 4) – (NCO code **333309**).

In turn, the qualification of PV installer, which is covering all PV system phases: design, installing, mentenance needs a minimum EQF 4 and is based on a certificate that must be periodically renewed (NCO code 741103).

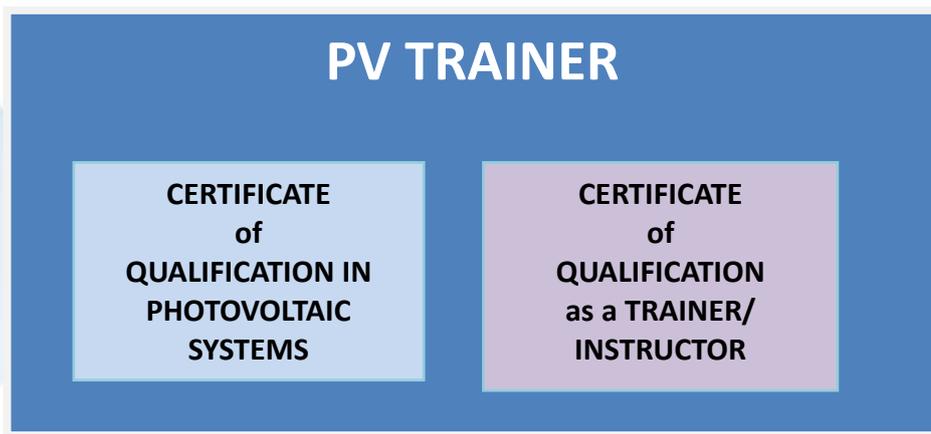


Fig. 3.4. Structure of the qualifications required for a PV trainer in Romania

All of these qualifications can be acquired in an authorized Training Centre, and must be validated and certified at completion through an evaluation procedure. The certificate/diploma delivered after passing the final evaluation will prove expertise in the training filed.

The course for **Trainer** is addressing any persons possessing at least a bachelor degree and who want to work in the field of vocational training.

The Occupation of Trainer targets the training specialist who designs, develops, evaluates and reviews the theoretical or practical activities or training and develops training programs for professional skills carried out in specialized institutions or in the workplace.

The **Instructor/Junior trainer** course is intended for people interested in adult education, secondary school graduates wishing to develop non-formal educational activities, or for persons with informal training experience that need a certification.

Table 3.10. VET Trainer and Instructor/Junior Trainer qualifications, in terms of Knowledge, Skills and Competences

	Trainer	Instructor/Junior trainer
Knowledge	<ul style="list-style-type: none"> – knowledge of what is involved in the management of a training process (identifying the need for training, planning, marketing, organization, evaluation); – will know how to plan, support and evaluate an interactive learning session on a theme of choice; – knowledge about a wide range of training methods, techniques for participants motivation and involvement. 	<ul style="list-style-type: none"> – knowledge of what training involves through specific activities; – knowledge about wide range of training methods, motivation techniques of participants.
Skills	<ul style="list-style-type: none"> – improved communication skills; – team work; – abilities to use training methods; – capabilities to motivate trainees and to involve participants to training activities. 	<ul style="list-style-type: none"> – improved communication skills with superiors, equals or subordinates; – team work; – abilities to use training methods; – capabilities to motivate trainees and to involve participants to training activities.
Competences	<ul style="list-style-type: none"> – designing and preparing theoretical training activities; 	<ul style="list-style-type: none"> – designing training activities; – ensuring the management of the

	Trainer	Instructor/Junior trainer
	<ul style="list-style-type: none"> – designing practical training activities; – management of training process; – performing training activities; – evaluation of training participants; – evaluation of the training session; – integration of IT technologies in training; – trainees counselling; – involving in organization development and partnerships between organization and community; – providing career management and personal development. 	<ul style="list-style-type: none"> – training process; – evaluation of training activities; – ensuring the functionality of specific equipment in workshops/laboratories; – integration of IT technologies in training; – trainees counselling; – involving in organization development and partnerships between organization and community; – providing career management and personal development.

In Romanian' educational public system, it doesn't exist independent study programs for preparing the PV installers.

One condition to acquire PV installer qualification is to be a certified/authorized electrician worker (minimum IIB level). A person wishing to become an authorized electrician worker can follow a qualification course of electrician worker in a public school or in an authorized training centre. After obtaining the electrician qualification, in order to practice the job of electrician, the person must pass the authorization test of **NAER (National Authority for Energy Regulation, ANRE in Romanian)** for obtaining the authorization certificate.

This certificate gives the right to free practice as independent on national market.

There are two possibilities to obtain **qualification in PV system installation, design and maintenance**:

- to follow a course at an authorized Training Centre – ended with a completion by certificate recognized in EU that covers all PV system phases: design, installing, maintenance; the certificate must be periodically renewed,
- to follow a course at a producer/importer of PV systems – with a completion certificate recognized only within the network of producers/importers.

Example of qualification courses in Romania for PV installer:

- Course PVTRIN project (<http://pvtrin.eu/en/home/index.html>) – 40 h theory + 56 h practice + 26h tutoring. PVTRIN Project 2013 (www.pvtrin.eu, partners, Greece, Bulgaria, Croatia, Cyprus, Romania, Spain). Project was developed under CE program – Intelligent Energy Europe and proposed Training and certification path for small PV systems installers finished with EU certificate that must be periodically renewed;
- Course BIPV and BAPV – international certificate (<http://www.calificat.ro/cursuri-autorizate/instalator-fotovoltaice.html>) or national certificate offered by AREL (Electricians Association – <http://www.arel.ro/cursuri-calificare-si-perfectionare/curs-sistemul-fotovoltaic>), National Institute for Research and Development in Energy (<http://www.icemenerg.ro/>);
- International Network in the project "RETS: Renewable Energies Transfer System" (<http://www.rets-project.eu/en/accueil/>).

Table 3.11. PV Installer Qualification in terms of Knowledge, Skills and Competences

	PV Installer
Knowledge	<ul style="list-style-type: none"> – legal regulations on health and safety at work and in the field of emergency situations; – legal regulation in renewable energy systems domain; – environmental protection rules; – knowledge about elements, structure, functions, connectivity of a PV system; – technologies in PV systems; – rules for designing techniques and for determining the place of PV systems.
Skills	<ul style="list-style-type: none"> – improved communication skills; – team work.
Competences	<ul style="list-style-type: none"> – design solar system and make proposals for optimal solutions; – organization of the workplace; – ensuring the quality of the executed works; – maintenance of work equipment; – providing materials for construction works; – installing photovoltaic modules; – mounting the support structure of photovoltaic systems; – making electrical connections between photovoltaic system components; – ensure the maintenance of photovoltaic systems.

Table 3.12. A description of engineering studies at University in renewable energy sources

Name:	Engineering for renewable energy systems
EQF	Level 6 (Tertiary university studies)
Synthesis:	<p>Study program meets a real need identified on the labour market. Specialists will have competences in promoting, designing, prototyping, implementation, operation, auditing systems based on renewable energy sources. The curriculum is structured for gradual accumulation of knowledge, including fundamental engineering disciplines and specific engineering disciplines for renewable energy systems.</p>
Knowledge and skills	Graduates acquire integrated skills for design, implementation and management of renewable energy systems, along with knowledge enabling them to quickly integrate the latest developments related to the rational use and saving raw materials and energy sources essential for a sustainable development.
Universities	<ul style="list-style-type: none"> – Transilvania University of Brasov, Faculty of Product Design and Environment; – University of Oradea, Faculty of Engineering in Energy and Industrial Management.
Additional professional tasks:	<ul style="list-style-type: none"> – technical supervision in public administration to advocate and reconcile the documents related to sanitary installations, – advising on the possibility of using the of RES devices, – participation in research related to RES devices– performing complementary (measuring and auxiliary) work.

Table 3.13. A description of the Romanian Master degree in the field of renewable sources of energy

Name:	Renewable sources of energy
EQF	Level 7 (university studies with short period – 2 years) Master
Synthesis:	The Master programs ensure the elaboration of analysis, reports and documentation summaries, technical and economic studies, regarding the design of systems with renewable energy sources.
Knowledge and skills	<p>Graduates will have in-depth knowledge of concepts, theories and methods of fundamental investigation in the field of construction works in engineering and about management of renewable energy sources.</p> <p>They are capable to elaborate technical-economic studies, reports and synthesis of</p>

Name:	Renewable sources of energy
	documentation, regarding the design of systems with renewable energy sources; to manage building-assembly works and to use of renewable energy sources (consumer, industrial, etc.). They develop advanced physical and mathematical models for solving the problems specific to the technologies for renewable energy sources. The graduates are able to work in complex projects using collaborative design. They have ability to model and simulate the structures and processes specific to the renewable energy domain, and capacity to assess the potential of renewable energy sources and environmental impact.
Universities in Romania	<ul style="list-style-type: none"> – Dunarea de Jos University of Galati – Transilvania University of Brasov, Faculty of Product Design and Environment – Politechnical University of Bucharest – Faculty of Energy – Ovidius University of Constanta – Faculty of Applied Science and Engineering – University of Oradea, Faculty of Engineering in Energy and Industrial Management
Additional professional tasks:	<ul style="list-style-type: none"> – The ability to synthesize, interpret and communicate an extensive information system, to solve complex problems and to critically analyse the conclusions. – Identifying the role and responsibilities into a multidisciplinary team and applying effective techniques for good relationship within a working team. – To have initiative to analyze and to resolve of complex problems.

Table 3.14. Romanian NQF for the formal educational system

Age	Grade	Education level in Romanian NQF			Equivalent level in EQF
>19		Phd			8
		Master degree			7
		Bachelor long period short period			6 5
			Tertiary non-universitary schools		4
18		Secondary Schools			
17	XII	Theoretical Secondary School (High schools)	Technical or Vocational Secondary School (industry, services, environment, education, medical)	Technical or Vocational Schools (industry, services, environment)	3
16	XI				2
15	X				1
14	IX				
13	VIII	Gymnasium (4 years)			
12	VII				
11	VI				
10	V				
9	IV	Primary school			

Age	Grade	Education level in Romanian NQF	Equivalent level in EQF
8	III	(5 years)	
7	II		
6	I		
5		Kindergarten (3 years)	
4			
3			

3.2.6. General structure of a Romanian Occupational Standard

In Romania, the specifications of any occupational standard are composed of so-called "**areas of competence**", which can be: fundamental (basics), job general, job specific competences and job optional. The competence area is further divided into "**units of competences**" (Table 3.15).

Table 3.15. General structure of the Occupational Standard for a job in Romania

AREAS of COMPETENCE	NO.	UNITS of COMPETENCE
FUNDAMENTAL COMPETENCIES	1.	Communication in national language and in foreign languages
	2.	Basic competences in mathematics, science and technology
	3.	Basic IT competences
	4.	Learning competences
	5.	Social and intercultural competences
	6.	Entrepreneurial competences
JOB GENERAL COMPETENCIES	7.	Respect of legal regulations in the training domain
	8.	Apply legal regulations on occupational health, safety and emergencies
	9.	Apply environmental regulations
	10.	Apply the quality standards for training activities
JOB SPECIFIC COMPETENCIES	11.	Planning training activities
	12.	Running training activities
	13.	Evaluating trainees and ensuring quality of training
	14.	Applying special methods and techniques of training
<i>Optional</i> MANAGEMENT OF TRAINING PROGRAMS	15.	Marketing training
	16.	Design of training programs
	17.	Organizing programs and internships

Each unit of competence has several elements of competences with associated performance criteria. In addition, the units of competence possess a defined list of variables, knowledge, and sometimes, an evaluation guide and a description of context. The next table details the structure of occupational standards approved by NQA (National Qualification Authority) (see Table 3.16).

Table 3.16. In deep structure description of the Occupational Standard for a job in Romania

UNIT of COMPETENCE	Elements of Competence	Performance criteria	Variables	Knowledge	Evaluation guide	Description of context
	Elements of Competence	Performance criteria				
	Elements of Competence	Performance criteria				
	Elements of Competence	Performance criteria				

The equivalence existing between the components of a Romanian Occupational Standard and EU's EQF-KSC matrix articles can be observed in Table 3.17.

All tables above use same colour for the corresponding articles in the standards, as a way to represent the equivalences between them.

Based on these correspondences, in the next chapter there are job descriptions taken from Romanian occupational standards and translated into EQF matrix.

Table 3.17. Equivalences between the Romanian Occupational/Qualification standard's components and the EQF

EQF framework	Romanian occupational standards
Knowledge	Knowledge
Skills	Performance criteria associated with the capacity to complete tasks OR Evaluation guide
Competences	Competence units Elements of competences

Based on these correspondences, in the next chapter there are job descriptions taken from Romanian occupational standards and translated into EQF matrix.

3.2.7. Job Description of a Qualified Trainer in Romania

1) Structure of the Occupational Standard of Trainer

The Romanian Qualification Standard for a VET trainer, i.e. a certified person involved in a training program and being able to conduct/carry out VET training activities, has been developed by the Romanian National Qualification Agency (NQA).

The standards specify the two categories of personnel that could be involved in these training activities:

- **The Trainer**, defined as a specialist who designs, delivers, evaluates and revises theoretical or practical activities and/or programs meant to develop or enhance competences in a field of a professional domain/area.
- **The Instructor**, who is a person who delivers practical training in secondary vocational education establishments or conducts tutoring activities at work place.

The National Classification of Occupations standard (NCO) of Romania specify the trainer qualification through eight competences divided into two categories: compulsory (job specific) and optional.

The compulsory competences enable trainers: to prepare training, to conduct training activities, evaluate the trainees and apply training special methods and techniques.

The compulsory competences for all categories of trainers with higher level qualifications:

- planning training activities:
 - identifying the training objectives in terms of learning outcomes according to the needs of participants and current legislation,

- establishing the overall training program strategy,
- planning the learning environment and documents,
- choosing adequate physical environment,
- acquiring and developing support materials,
- running training activities:
 - informing trainees about the training program,
 - increasing their motivation, engagement and self-assessment,
 - implementing in-class training,
 - managing conflict,
 - providing feedback to the trainees,
- evaluating trainees and ensuring the quality of training:
 - using evaluation methods and tools,
 - organizing evaluation sessions,
 - recording evaluation results and preparing evaluation reports on the training program,
- applying special methods and techniques of training:
 - encouraging critical self-assessment and self-development,
 - promoting learning through peer learning and group work,
 - working in teams with other trainers and related personnel,
 - renewing personal training approaches, methods and techniques,
 - developing more general learner competences, such as job market exploration, information searching, and career development.

Optional competences category are summarized in those skills/competences that enable trainers: to achieve marketing training, to design training programs, organize programs/training courses, evaluate, review and ensure quality of programs/training sessions. They are the followings:

- marketing of training:
 - recommending a training program most relevant to the learning needs and objectives;
- design of training programs:
 - establishing an overall training program strategy by identifying theoretical and practical parts, relevant techniques, time planning, evaluation sessions and performance indicators;
- practical organization of internships:
 - negotiating a training program with a founder,
 - establishing working units (groups or individuals),
 - arranging breaks, transportation, meals, if necessary;
- evaluation, review and quality assurance for training programs:
 - monitoring the effectiveness of a training program,
 - conceiving evaluation portfolios,
 - reviewing the training program,
 - promoting quality assurance methods to the training provider and beneficiaries.

2) Translation of Occupational Standard into EQF format

The compulsory, job specific competences as they are stipulated by Romanian National Qualification Standard (NQS) no 242401 are divided in areas of competence, each one having several units of competence (table 3.18). The components of the Units of competence can be translated into the EQF KSC format as shown in Table 3.19.

Table 3.18. The general structure of an occupational standard in Romania

AREAS of COMPETENCE	NO.	UNITS of COMPETENCE
FUNDAMENTAL COMPETENCIES	1.	Communication in national language and in foreign languages
	2.	Basic competences in mathematics, science and technology
	3.	Basic IT competences
	4.	Learning competences
	5.	Social and intercultural competences
	6.	Entrepreneurial competences
JOB GENERAL COMPETENCIES	7.	Respect of legal regulations in the training domain
	8.	Apply legal regulations on occupational health, safety and emergencies
	9.	Apply environmental regulations
	10.	Apply the quality standards for training activities
JOB SPECIFIC COMPETENCIES	11.	Planning training activities
	12.	Running training activities
	13.	Evaluating trainees and ensuring quality of training
	14.	Applying special methods and techniques of training
<i>Optional</i> MANAGEMENT OF TRAINING PROGRAMS	15.	Marketing training
	16.	Design of training programs
	17.	Organizing programs and internships
	18.	Evaluation, review and quality assurance for training programs

Table 3.19. Occupational standard for Trainer in Romania transposed in terms of KSC

AREA of COMPETENCE	KNOWLEDGE	SKILLS	UNITS of COMPETENCE	ELEMENTS of COMPETENCES
JOB SPECIFIC COMPETENCIES Training professional staff	<ul style="list-style-type: none"> – Basic requirements of learning domain. – Knowledge about the occupational and/or training standard relevant to the program. – Design and organize of training activities. – Rules of safety, security and occupational health. – Knowledge, skills, and attitudes that will constitute the contents of training. 	<ol style="list-style-type: none"> 1.1. The objectives are relevant for knowledge and skills acquiring and compliant to the requirements of the occupation. 1.2. The operational objectives are formulated in terms of learning outcomes – what the trainees will be able to make at the end of the training. 1.3. The operational objectives are appropriate to the trainees' individual characteristics. 1.4. The operational objectives are appropriate to the needs of trainer. 	1. Planning training activities	1. Define training objectives
		<ol style="list-style-type: none"> 2.1. Training activities are defined according with set of operational objectives. 2.2. Training activities are adapted to individual characteristics of trainees. 2.3. Training activities are defined according to training group size. 2.4. Training activities are defined according to resources available to the training provider. 2.5. Learning contents are appropriate with learning targets. 2.6. Learning activities are organized from simple to complex in order to ensure objectives achievement. 		2. Design of training activities
		<ol style="list-style-type: none"> 3.1. Designed learning situations, materials and expected equipment are suitable for targeted objectives and skills. 3.2. Assessment methods and tools match with provided learning situations set. 3.3. Assessment methods and tools meet the needs of the target group. 3.4. Training barriers – related to training conditions or to participants – are identified, assessed and their effect must be 		3. Building learning situations

AREA of COMPETENCE	KNOWLEDGE	SKILLS	UNITS of COMPETENCE	ELEMENTS of COMPETENCES
		<p>diminished.</p> <p>4.1. Training conditions are provided with the respect of legislation and training program.</p> <p>4.2. Training conditions are suitable to the individual characteristics of participants.</p> <p>4.3. Equipment and materials are available when it is expected to be used in the training process.</p> <p>4.4. Visual materials used are visible and attractive.</p> <p>4.5. Resources and training materials are accessible to the trainees.</p> <p>5.1. Venue of each training activities is selected and organized according to the objectives and competences to be achieved.</p> <p>5.2. The arrangement of the workspace facilitates the communication between the trainees and between them and trainer.</p> <p>5.3. Training area is clearly distinguished from the location for breaks and relaxation.</p> <p>5.4. Participants have access to training facilities: bathroom, restroom, seating areas.</p> <p>5.5. Equipment/materials required for training activity are available from the beginning throughout the training program.</p> <p>5.6. Equipment is checked before starting activity.</p> <p>6.1. The course is adapted to the needs and characteristics of target group.</p> <p>6.2. The course and the supporting materials are up to date and contain all the necessary information for achieving the training objectives.</p> <p>6.3. The course and the supporting materials are relevant for achieving the training objectives and for getting the targeted skills by the trainees.</p>		<p>4. Organizing training activities</p> <p>5. Organize the training environment</p> <p>6. Prepare support materials</p>
<p>JOB SPECIFIC COMPETENCIES</p> <p>Training professional staff</p>	<ul style="list-style-type: none"> - The rules of labour protection and fire prevention. - The main training methods. 	<p>1.1. Participants are informed about the training program and daily / weekly activities.</p> <p>1.2. Participants are informed about training objectives and assessment methods.</p> <p>1.3. Participants are informed about training learning spaces and available facilities.</p> <p>1.4. Participants are taught on training specific conditions about health and safety (SSM) and fire prevention and firefighting.</p> <p>2.1. Specific work tasks are adapted to the specific individual trainees.</p> <p>2.2. The tasks are clearly formulated.</p> <p>2.3. Trainer behaviour is adapted to the individual and to the group characteristics of trainees.</p> <p>2.4. Trainer's eye contact with participants is maintained throughout training activities.</p> <p>2.5. Trainees are encouraged to have initiative and to express their views, dilemmas and emotional states.</p> <p>2.6. Personal experience of participants is used in training process.</p> <p>2.7. It is encouraged self-assessment.</p> <p>2.8. Special attention is given to participants need and special learning difficulties.</p>	<p>2. Running training activities</p>	<p>1. Inform participants about training activities</p> <p>2. Trainees motivation</p>

AREA of COMPETENCE	KNOWLEDGE	SKILLS	UNITS of COMPETENCE	ELEMENTS of COMPETENCES
		3.1. Dress trainer is suitable for learning situations. 3.2. Agreed work program is followed, except the cases of force majeure. 3.3. Individuals units or groups are formed in accordance with the law. 3.4. Participants are encouraged to have a pro-active attitude. 3.5. Methods, techniques and training procedures used are suitable for conducting concrete training program. 3.6. Methods, techniques and training procedures are effectively adapted to the individual characteristics of trainees. 3.7. The trainer will offer opportunities to all participants to practice the skills and apply knowledge. 3.8. Physical safety of trainees, security standards and occupational health are respected.		3. Facilitating learning activities
		4.1. Conflicts between participants are identified and resolved following the principle of equity. 4.2. Conflict resolution is made taking into account the characteristics of the individuals involved. 4.3. Where appropriate, the trainer asks help for conflict resolution, from other persons or institutions.		4. Conflict resolution
		5.1. Behaviours that indicate goals achievement are identified and recorded. 5.2. Information about the objectives and skills target is offered permanent to the trainees. 5.3. The performances of trainees indicating achieving the targets are communicated to them. 5.4. Participants are involved in offering constructive feedback for colleagues. 5.5. The teacher applies methods and assessment tools which are discussed with the trainees. 5.6. Feed-back offered during training is associated with positive incentives and direct critics are avoided. 5.7. Feed-back at the end of the course is associated with recommendations for further development.		5. Provide feedback for trainees
JOB SPECIFIC COMPETENCIES Training professional staff	<ul style="list-style-type: none"> - Theoretical and practical knowledge in training area. - The relevant legislation on the assessment and certification of vocational skills. - Evaluation methodology – methods, techniques and procedures. 	1.1. Assessment of trainees is achieved with the methods and tools recommended in the training program. 1.2. Essential behaviours indicating objectives achievement are identified in the trainees' behaviour. 1.3. Participants are informed about assessment methods at the beginning of each test. 1.4. Assistance on the use of evaluation instruments is given to participants, throughout evaluation test. 1.5. Participants are informed about evaluation samples used during and at the end of the training program. 1.6. Samples of evaluation are applied taking into account the general principles of assessment. 1.7. Samples of evaluation are applied taking into account the individual characteristics of participants. 1.8. Participants receive feedback from the trainer about evaluation results in concordance with training	3. Evaluating trainees and ensuring quality of training	1. Application of assessment tools

AREA of COMPETENCE	KNOWLEDGE	SKILLS	UNITS of COMPETENCE	ELEMENTS of COMPETENCES
		<p>objectives.</p> <p>1.9. The trainer develops and applies formative assessment tools that are discussed / negotiated with the trainees.</p> <p>2.1. Evaluation sessions are organized in accordance with the law.</p> <p>2.2. Evaluation sessions are organized in accordance with the trainer's institution policies.</p> <p>2.3. Assessment instruments used are pre-tested.</p> <p>2.4. Assessment tools used are tailored to participants with special needs.</p> <p>3.1. Registration of evaluation results is made in the agreed format with respect of legal statements.</p> <p>3.2. Assessment records are completed in accordance with applicable laws.</p> <p>3.3. The evaluation report has the legal format and content under and it is consistent with training provider requirements.</p> <p>3.4. The evaluation report is consistent with policies and requirements of the training provider.</p>		<p>2. Organizing assessment sessions</p> <p>3. Record evaluation results and elaborate the program report</p>
	<ul style="list-style-type: none"> - Theoretical and practical knowledge in training area. - Training methodology. - Techniques of active listening, feedback and persuasive communication. - Modern technologies of information and communication. 	<p>1.1. Trainees are given systematically occasions and situations in order to demonstrate their practical experience.</p> <p>1.2. Critical reflection of participants over courses and personal opinions are encouraged.</p> <p>1.3. Trainees have opportunity to express their autonomy, through study and practice individual or self-led group.</p> <p>1.4. Domain language development is encouraged.</p> <p>1.5. Methods and techniques of persuasive communication are mainly used.</p> <p>2.1. Teamwork and self-organizing team are encouraged.</p> <p>2.2. The methods used in a group must be appropriate to objectives and content of training.</p> <p>2.3. The trainer encourages and supports group with students that have learning or practical difficulties.</p> <p>2.4. People with special needs are integrated into groups / work teams.</p> <p>2.5. Participants with experience above average knowledge level of the group are used as training resources.</p> <p>3.1. Programs and training sessions are designed, where appropriate, jointly with other trainers.</p> <p>3.2. The role of the trainer is changed if is needed, in the co-trainer / co-facilitator training.</p> <p>3.3. Different stages of training process are given to co-trainers according to their skills and performances.</p> <p>3.4. The trainer provides consultancy for defining the training needs, develop training programs, assessment the training.</p> <p>3.5. The trainer provides information about the documents for certification after pursuing a training program.</p> <p>4.1. Training procedures are sufficiently varied to meet the needs / expectations of individual or group</p>	<p>4. Applying Special methods and techniques of training</p>	<p>1. Encourage personal reflection and self-training</p> <p>2. Promoting learning through group dynamics</p> <p>3. Teamwork with other trainers and resource persons</p> <p>4. Flexible approach of training situations</p>

AREA of COMPETENCE	KNOWLEDGE	SKILLS	UNITS of COMPETENCE	ELEMENTS of COMPETENCES
		<p>of trainees.</p> <p>4.2. Unexpected situations and occurring conflicts are used in formative purposes.</p> <p>4.3. Elements of the work program are negotiated with trainees for optimization purposes.</p> <p>4.4. Non-formal and formal learning and trying and error based learning.</p> <p>4.5. Formative assessment results are used to improve training process.</p> <p>5.1. The trainer follows language rules (correct expression, consistent).</p> <p>5.2. Trainees are supported in domain's vocabulary acquisition.</p> <p>5.3. Trainees are supported for orientation in the labour market and society.</p> <p>5.4. Participants are encouraged to use different media and communication methods and to work in a team.</p> <p>5.5. Trainees and training candidates receive, upon request, conciliation for further professional development.</p>		<p>5. Develop transversal competences</p>
Optional Training program management	<ul style="list-style-type: none"> – The national system of vocational training and related legislation. – Methods of analysis and diagnosis of training needs. – Analysing capacity to provide appropriate institutional programs. – Marketing education: methodology for market studies, studies of learning needs, positioning studies, implementation studies, development/ restructuring studies, impact studies. 	<p>Training needs and demand for training are identified by the training expert through various methods and specific instruments. At the same time, training programs should be promoted in the market of training programs, in order to inform and attract possible clients and beneficiaries.</p>	5. Marketing training	<p>1. Identifying organizational needs</p> <p>2. Promoting training program</p>
	<ul style="list-style-type: none"> – The national system of vocational training and related legislation. – Methods of analysis and diagnosis of training needs. – Training methods. 	<p>Training expert is involved in designing of training programs starting from objectives. Training programs have goals and benchmarks to be developed starting from qualification standards and existing training programs. Beginning from these goals and objectives, programs are broken down into sub-modules.</p>	6. Design training programs	<p>1. Establishing training objectives</p> <p>2. Resource identification</p> <p>3. Designing training materials</p> <p>4. Establish strategy and building program formation</p>
	<ul style="list-style-type: none"> – Training methods. – Equipment and materials necessary for training. – Legal rules for the establishment of work units. – Ergonomics and legal conditions for supplementary facilities. 	<p>Before implementing the training program, it is necessary that all conditions – logistics and intellectual – to be provided, including, where necessary, facilities for transportation, meals and accommodation for trainees or trainers. In addition, the program as a whole will be negotiated, where needed, with representatives of the employer or training provider. At the same time, must be obtained in advance all legal authorizations required for carrying out training.</p>	7. Organizing programs and internships	<p>1. Training program negotiation</p> <p>2. Training units' development</p> <p>3. Supplementary facilitation assurance</p>
	<ul style="list-style-type: none"> – Occupational field of the training. – Training methodology. – The relevant legislation of the evaluation and approval of training and certification training programs. – Program evaluation methodology – methods, techniques and procedures. – Evaluation systems and quality certification – ISO, EFQM etc. 	<p>The evaluation covers the entire training program, but also the trainer. Depending on the evaluation results, program will be reviewed, optimized and adapted to the needs and the demand for training.</p>	8. Evaluation, review and quality assurance for training programs	<p>1. Evaluation methods development</p> <p>2. Efficiency evaluation</p> <p>3. Training program review</p> <p>4. Following the criteria for quality assurance</p>

3.3. Spain

Experience of the Spanish partner of the project and the conducted analysis of documents show that **in Spain there is no joint methodical description of the requirements within the scope of professional competence of the vocational education and training for PV trainers.** However, there are methodical descriptions of two professional qualifications that, once combined, give access to training for PV trainers:

- a) Assembly and maintenance of solar photovoltaic systems (Spanish code: ENA261_2),
- b) Teaching of training for employment (Spanish code: SSC448_3).

The aim is to identify and conduct a comparative analysis of existing descriptions of professional competence for a PV trainer presented in the form of descriptions of occupations, qualification or professional standards or other equivalent documents, i.e.: core curricula for vocational education, modular education programs based on the methodology of Modules of Employable Skills (MES), bids of the training of commercial companies or other equivalent documents that can be adapted for the purposes of preparing competency requirements for PV trainers in vocational education and training.

The method of analysing documents in the form of qualitative and formal analysis was applied for a comparative analysis. In addition, an internal analysis was also conducted to learn the content of each document, understand it properly and explain, including the separation of their components (elements) and mutual relations – connections among them.

The analysis assumed initially that the profile of competency requirements for a PV trainer will consist of two competencies (Fig. 3.5):

- 1) specialist work related to PV installations,
- 2) and training.



Fig. 3.5. Structure of the qualifications required of a PV trainer

The aim of the study will be to:

- 1) identify professions associated with the PV trainer (with two proposed competences);
- 2) examine the formal requirements for the profession;
- 3) identify competency requirements descriptions (profession descriptions, qualification standards and/or professional capacity, core curricula for vocational education, competence profiles for courses, training, etc.);
- 4) know the structure for the description of competency requirements,

- 5) identify the existing links, connections between the various components of descriptions of relationships;
- 6) make an attempt to develop a common description of the competence requirements at the level of partner countries.

Such an approach is caused by identification of the needs of people conducting or interested in conducting theoretical and / or practical courses in the system of formal education (vocational schools, qualification courses), non-formal (vocational skills courses, training, practical apprenticeships in the workplace, etc.), or eventually – informal aimed at self-education, the aim of which is to prepare to perform professional tasks of PV trainers or self-training (informal learning). The information gathered indicate that during the development of the competence profile for the PV trainer the following issues should be taken into account:

- 1) the development a comprehensive profile, because the trainer should have knowledge and skills in the area of teaching methodology and specialized professional awareness. In Poland, there are often situations that trainers conduct classes based only on the theoretical knowledge of profession without work experience;
- 2) consider the needs of people engaged in vocational education or training already, and especially in this case, fill the gaps in competence during the phase of the preparation of the trainer as well as the preparation of the specialized training;
- 3) meet the expectations of graduates interested in conducting practical training in the PV installations area;
- 4) assist the process of education in workplaces where appointed employees, often without trainer's preparation or with the gaps in expertise or without teaching background, are responsible for teaching students, trainees, apprentices or developing the qualification of new employees or employees already working;
- 5) promote the ideas of modular education, where the essential components of the learning outcomes are skills and knowledge is used to explain their operations.

In Spain, the analysis was based on the following documents:

- 1) Directive of the European Parliament and Council No. 2009/28/EC from 23 April 2009, on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (Dz. U. L 140/16 of 5.6.2009) In particular: Appendix IV: Certification of installers.
- 2) The Spanish Organic Law 5/2002 June 19th, on Qualifications and Vocational Education and Training.
 - 1) The Spanish Royal Decrees 1128/2003, September 5th and 1416/05, November 19th, Ministry of Employment and Social Affairs, regulating the National Catalogue of Professional Qualifications.
 - 2) The Spanish Royal Decree 1538/2006, December 15th, establishing the General Organisation of Vocational Training in the Education System.
 - 3) The Spanish Royal Decree 34/2008 January 18th and 1675/2010 December 10th. Ministry of Employment and Social Affairs, regulating Vocational Training for Employment.
 - 4) The Spanish Royal Decree 395/2007 March 23rd, Ministry of Employment and Social Affairs, regulating Vocational Training for Employment Subsystem.
 - 5) The Spanish Order PRE/1615/2015, July 23rd on the updating of professional qualifications of the Energy and Water professional family as defined in the National Catalogue of Professional Qualifications.
 - 6) The Spanish Royal Decree 229/2008, February 15th, on the regulation of VET National Reference Centres.
 - 7) National professional qualification standard: "Assembly and maintenance of solar photovoltaic systems" (Spanish code: ENA261_2).
 - 8) National professional qualification standard: "Teaching of training for employment" (Spanish code: SSC448_3).

3.3.1. The regulatory framework in Spain

1) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources¹⁴

The Directive applies for all EU Member States that is in all partner countries participating in the EU-PV Trainer project.

Article 14. Information and training states that:

- 3. Member States shall ensure that certification schemes or equivalent qualification schemes** become or are available by 31 December 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate, and shall be based on the criteria laid down in Annex IV. Each Member State shall recognise certification awarded by other Member States in accordance with those criteria.
- 4.** Member States shall make available to the public information on certification schemes or equivalent qualification schemes as referred to in paragraph 3. Member States may also make available the list of installers who are qualified or certified in accordance with the provisions referred to in paragraph 3.

Annex IV sets out the general recommendations for the certification of installers and states that certification schemes or equivalent qualification schemes referred to in Article. 14 paragraph. 3, are based on the following criteria:

1. The certification or qualification process shall be transparent and clearly defined by the Member State or the administrative body they appoint.
2. Biomass, heat pump, shallow geothermal and solar photovoltaic and solar thermal installers shall be certified by an accredited training programme or training provider.
3. The accreditation of the training programme or provider shall be effected by Member States or administrative bodies they appoint. The accrediting body shall ensure that the training programme offered by the training provider has continuity and regional or national coverage. The training provider shall have adequate technical facilities to provide practical training, including some laboratory equipment or corresponding facilities to provide practical training. The training provider shall also offer in addition to the basic training, shorter refresher courses on topical issues, including on new technologies, to enable life-long learning in installations. The training provider may be the manufacturer of the equipment or system, institutes or associations.
4. The training leading to installer certification or qualification shall include both theoretical and practical parts. At the end of the training, the installer must have the skills required to install the relevant equipment and systems to meet the performance and reliability needs of the customer, incorporate quality craftsmanship, and comply with all applicable codes and standards, including energy and eco-labelling.
5. The training course shall end with an examination leading to a certificate or qualification. The examination shall include a practical assessment of successfully installing biomass boilers or stoves, heat pumps, shallow geothermal installations, solar photovoltaic or solar thermal installations.
6. The certification schemes or equivalent qualification schemes referred to in Article 14(3) shall take due account of the following guidelines:
 - a) Accredited training programmes should be offered to installers with work experience, who have undergone, or are undergoing, the following types of training:
 - (iii) in the case of a solar photovoltaic or solar thermal installer, training as a plumber or electrician and have plumbing, electrical and roofing skills, including knowledge of soldering pipe joints, gluing pipe joints, sealing fittings, testing for plumbing leaks, ability to connect wiring, familiar with basic roof materials, flashing and sealing methods as a prerequisite, or;

¹⁴ <http://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=CELEX:32009L0028&from=PL>, 20.09.2016.

(iv) a vocational training scheme to provide an installer with adequate skills corresponding to a three years education in the skills referred to in point (a), (b) or (c) including both classroom and workplace learning.

- d) **The theoretical part of the solar photovoltaic and solar thermal installer training** should give an overview of the *market situation of solar products and cost and profitability comparisons, and cover ecological aspects, components, characteristics and dimensioning of solar systems, selection of accurate systems and dimensioning of components, determination of the heat demand, fire protection, related subsidies, as well as the design, installation, and maintenance of solar photovoltaic and solar thermal installations.* The training should also provide *good knowledge of any European standards for technology, and certification such as Solar Keymark, and related national and Community law.* The installer should demonstrate the following **key competences**:
- (i) *the ability to work safely using the required tools and equipment and implementing safety codes and standards and identify plumbing, electrical and other hazards associated with solar installations;*
 - (ii) *the ability to identify systems and their components specific to active and passive systems, including the mechanical design, and determine the components' location and system layout and configuration;*
 - (iii) *the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar water heater, taking account of shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate and identify different installation methods suitable for roof types and the balance of system equipment required for the installation; and*
 - (iv) *for solar photovoltaic systems in particular, the ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate interconnection point.*
- e) The installer certification should be time restricted, so that a refresher seminar or event would be necessary for continued certification.

2) The Spanish Organic Law 5/2002 and the recognition, evaluation and accreditation system

The definition, monitoring and accreditation of qualifications are carried out by the INCUAL (Spanish National Institute of Qualifications), a public agency dependent on the State Ministry of Education, Culture and Sports. According to the Spanish Organic Law 5/2002, INCUAL has the responsibility to define, elaborate and keep updated the National Catalogue of Professional Qualifications and the corresponding Modular Catalogue of Vocational Training.

The procedure for recognition, evaluation, accreditation and registration of professional qualifications is one of the instruments of the National System of Qualifications and Vocational Training (National Qualifications Framework or NQF), being one of the aims of the system to evaluate and officially accredit professional qualifications whatever the form of their acquisition.

The evaluation and accreditation of professional competences acquired through work experience or non-formal training pathways will have as reference the National Catalogue of Professional Qualifications and will be developed following in any case criteria that guarantee the reliability, objectivity and technical rigor of the evaluation.

If the professional competences evaluated to the worker, do not reach the qualifications needed for obtaining a professional qualification or professional certificate, a partial cumulative accreditation is offered. In this way, if the worker so desires, she or he can complete her or his training to obtain the corresponding degree or certificate.

In Spain, more than 60% of the working population does not have a recognized professional qualification. In addition, there is an important volume of non-formal learning whose lack of

recognition, especially in groups such as women, immigrants, unemployed workers, can result in situations of deficient transition in the labour market, with the consequent risk of exclusion.

The Government, after consulting the General Council of Vocational Training, shall establish the requirements and procedures for the evaluation and accreditation of competencies, as well as the effects thereof.

Therefore, there are two ways for obtaining a professional qualification:

VET Diploma	Professional evaluation and accreditation
<p>It is the document obtained by overcoming the modules of a vocational training cycle of the Educational System, offered by any accredited VET centre by the State Ministry of Employment. There are Medium Degrees and there are High Degrees. To access the first you need to be in possession of the degree of Graduated in ESO (secondary compulsory education), or have passed an entrance test, or the university entrance test for over 25 year-old. To access the High Degree it is necessary to have the title of Bachiller (upper secondary education), or to have passed a test of access, or the test of access to the university for over 25 year-old.</p> <p>Unlike Professional Certificates, the Degrees have academic and professional validity, allowing them to continue to other levels of the educational system, either to the Bachiller (upper secondary education) or to university studies.</p>	<p>Once the candidate is registered, the procedure is properly initiated, which takes place in the following three phases:</p> <p>Advice. At this stage an advisor will accompany and advise the candidate to prepare the necessary documentation.</p> <p>Evaluation process. At this stage it is a question of demonstrating the professional competences for which accreditation is requested. The evaluation methods most appropriate to the characteristics of the candidate will be used and depending on the unit of competence to be evaluated.</p> <p>Accreditation of professional competence. In this phase an accreditation will be issued for each of the units of competence that have been exceeded.</p>

According to INCUAL (Spanish National Institute of Qualifications), citizens wishing to participate in the procedure must meet the following requirements:

- a) Possess the Spanish nationality, having obtained the certificate of registration of community citizenship or the family card of a citizen or citizen of the Union, or holding a residence permit or, of residence and work in Spain in force, in the established terms In the Spanish legislation on immigration and immigration.
- b) Be 18 years old at the time of enrolment, in the case of units of competence corresponding to qualifications of level I, and 20 years levels II and III.
- c) Have work experience and / or training related to the professional competences that they wish to accredit:
 - c.1) In the case of work experience: justify, at least 3 years, with a minimum of 2,000 hours worked in total, in the last 10 years before the call was made. For Level I proficiency units, 2 years of work experience will be required with a minimum of 1,200 hours worked in total.
 - c.2) In the case of training: justify, at least 300 hours, in the last 10 years before the call was made. For Level I proficiency units, at least 200 hours are required. In cases where the training modules associated with the unit of competence to be accredited contemplate a shorter duration, the hours established in those modules must be accredited.

Among the **functions of INCUAL**, these can be highlighted:

Propose the establishment and management of the National System of Professional Qualifications.

- a) Establish a base methodology to identify the professional competencies and define the model that must adopt a professional qualification to be incorporated into the National System of Professional Qualifications.

- b) To propose a system of accreditation and professional recognition.
- c) Establish criteria on the basic methods to be followed in the assessment of competence and on the procedure for the granting of accreditation by the competent authorities.
- d) Propose the procedures to establish modalities for accreditation of professional competencies of the National System of Professional Qualifications, as well as for their updating.
- e) Perform the tasks necessary to establish a frame of reference for the overall programming of all subsystems; At the same time, support the normative and regulatory task of Vocational Training.
- f) Propose the necessary measures for the regulation of the system of correspondences, validations and equivalences between the three subsystems of VET (regulated, occupational and continuous), including work experience.
- g) Improve the design and content of certificates of professionalism; Certifications and correspondences between these and the competency units (associated with modules of professional titles of the Initial Regulated Vocational Training) will be facilitated.
- h) Propose, through the General Vocational Training Council, the definition of the scope of the Occupational Training modules, with a view to their capitalization, by means of the corresponding certificate of professionalism, for the worker who takes them.
- i) Make proposals on the certification of continuous training actions, in relation to the National Qualifications System, through its integration into the Professional Certificates System, both in legal and operational terms.

3) The Spanish Qualification Framework

The Spanish **National System of Qualifications and Vocational Training (SNCFP)**, established by Organic Law 5/2002 of June 19, consists of instruments and actions necessary to promote and develop the integration of vocational training offers, as well as the Evaluation and accreditation of the corresponding professional competences.

The SNCFP is created to respond to the demands of qualification of the people and the companies in a society in continuous process of change and innovation.

The aim of the SNCFP is to orient training to the demands of qualification of productive organizations, to facilitate the matching between the supply and demand of the labour market, to extend training throughout life, beyond the traditional educational period, and to promote the free movement of workers. The SNCFP therefore plays an essential role in the labour and training field.

The **National Catalogue of Professional Qualifications (CNCP)** is the instrument of the National System of Qualifications and Professional Training that regulates the professional qualifications, object of recognition and accreditation, identified in the productive system, according to the appropriate competencies for the professional exercise.

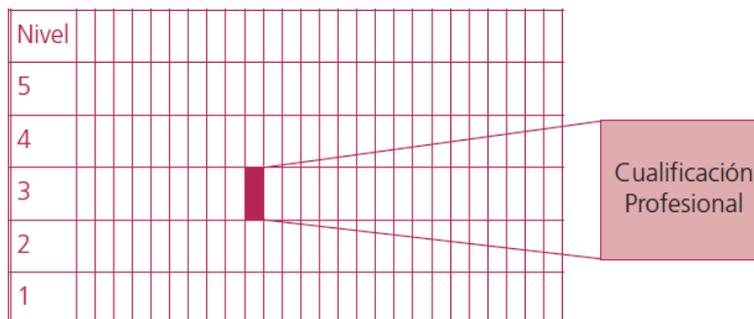
The CNCP has among its main objectives to enable the integration of vocational training offerings, adapting them to the characteristics and demands of the production system, and serving as a reference point for evaluating professional competencies.

The CNCP comprises the most significant professional qualifications of the Spanish production system. It includes the content of the professional training associated to each qualification, with a structure of formative modules articulated in a Modular Professional Training Catalogue. (CMF).

The National Institute of Qualifications (INCUAL) is responsible for defining, elaborating and maintaining the CNCP and the corresponding CMF.

The Catalogue is organized into professional families and levels. Thus, 26 professional families have been defined – according to criteria of affinity of the professional competence of the occupations and detected jobs – and 5 levels of qualification, according to the degree of knowledge, initiative, autonomy and precise responsibility to carry out this professional activity.

26 Familias Profesionales



26 Professional Families

- | | |
|--|--|
| 1. Agrarian | 14. Building and Civil Works |
| 2. Maritime-Fisheries | 15. Glass and Ceramics |
| 3. Food Industries | 16. Wood, Furniture and Cork |
| 4. Chemistry | 17. Textile, Apparel and Leather |
| 5. Personal Image | 18. Graphic Arts |
| 6. Health | 19. Image and Sound |
| 7. Safety and Environment | 20. Computer Science and Communications |
| 8. Mechanical Fabrication | 21. Administration and Management |
| 9. Installation and Maintenance | 22. Trade and Marketing |
| 10. Electricity and Electronics | 23. Socio-Cultural Services and the Community |
| 11. Energy and Water | 24. Hospitality and Tourism |
| 12. Transportation and Maintenance of Vehicles | 25. Physical and Sports Activities |
| 13. Extractive Industries | 26. Arts and Crafts |

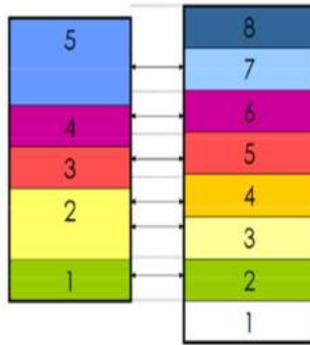
Spanish Qualification Levels (CNCP)

Level 1	Competence in a small set of relatively simple work activities corresponding to standard processes, with limited theoretical knowledge and practical skills.
Level 2	Competence in a set of well-defined professional activities with the ability to use their own instruments and techniques, which mainly concerns an execution work that can be autonomous within the limits of these techniques. It requires knowledge of the technical and scientific fundamentals of its activity and the ability to understand and apply the processes.
Level 3	Competence in a set of professional activities that require mastery of various techniques and can be executed autonomously. It carries responsibility for coordination and supervision of technical and specialized work. It requires an understanding of the technical and scientific foundations of the activities and the evaluation of the factors of the process and their economic impact.
Level 4	Competence in a wide range of complex professional activities carried out in a wide variety of contexts that require combining technical, scientific, economic or organizational variables to plan actions, define or develop projects, processes, products or services.
Level 5	Competence in a wide range of highly complex professional activities carried out in various contexts, often unpredictable, involving planning actions or designing products, processes or services. Great personal autonomy. Frequent responsibility in the allocation of resources, in the analysis, diagnosis, design, planning, execution and evaluation.

Spanish vs. European Qualification Framework

The Spanish structure of the Levels of Qualification (on the left) are different from the European Qualification Framework (on the right). Nevertheless, there is an equivalence protocol

In the National Catalogue of Professional Qualifications, there are two Spanish Professional Qualifications that can be related to both, the photovoltaic installer and trainer:



a) Assembly and maintenance of solar photovoltaic systems (Spanish code: ENA261_2)

a. Family: Energy and Water

b. Level (Spanish): 2

b) Teaching of training for employment (Spanish code: SSC448_3)

a. Family: Socio-Cultural Services and the Community

b. Level (Spanish): 3

There is no joint photovoltaic installer trainer professional qualification, since there are formal procedures to combine separate qualifications to provide quality training.

The trainers, to teach courses in certain areas, must prove to have teaching competence. In addition, they must meet the specific requirements indicated by each of the training modules of professional certificates that guarantee that they master the knowledge and techniques related to the units of competence they will teach.

For instance, a professional with teaching experience in the Energy and Water Family must have the Professional Certificate of Teaching of Training for Employment if he or she wants to teach the Professional Certificate “assembly and maintenance of solar photovoltaic systems”, unless a case for exemption applies. Furthermore, he or she will have to accredit the necessary titles and professional experiences as defined in the Professional Qualification profile he or she is expected to teach. These requisites are detailed for each competence unit of the Professional Qualification standard.

Trainers are exempt from possessing Professional Certificate of Teaching of Training for Employment if they obtained:

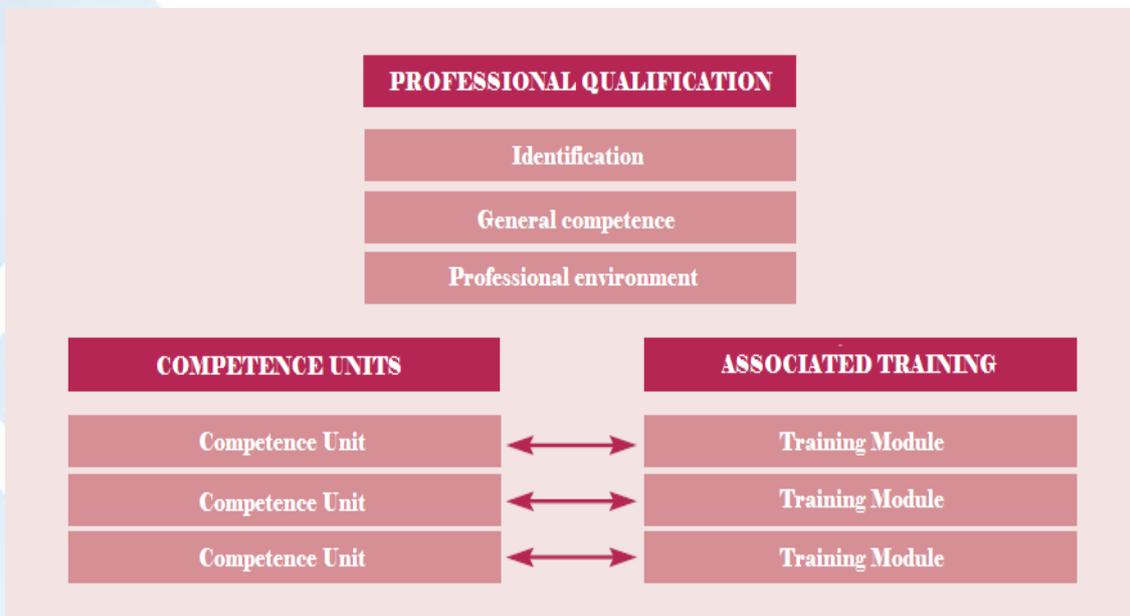
- 1) Official university degree of: Degree in Pedagogy, Psychopedagogy or Master in any of its specialties, or a university degree of graduate in the field of Psychology or Pedagogy or an official postgraduate university degree in those area.
- 2) Official university degree different from those indicated in the previous section and that is also in possession of the certificate of Pedagogical Aptitude or of the professional titles of Didactic Specialization and the Certificate of Pedagogical Qualification or a Master's University qualifying for the exercise of the Regulated professions of Compulsory Secondary Education and Baccalaureate, Vocational Training and the Official Schools of Languages.
- 3) Teaching experience: at least 600 hours in the last 10 years in vocational training for employment or in the education system.

4) The Spanish Professional Qualification Structure

According to INCUAL, a professional qualification is the set of occupational skills with significance for employment that can be acquired through modular training or other types of training, as well as through work experience. A person is qualified when in the development of his work he obtains results that are at the level demanded by the productive system. Qualification does not regulate the profession.

In Spain, the professional competence of a person is understood as the set of knowledge and skills that enable him to carry out the professional activity according to the demands of production and employment.

The description of Spanish Professional Competences follow the depicted structure:



Source: Arbizu, 2015, "Sistema Nacional de Cualificaciones y Formación Profesional. INCUAL

The **identification** of a professional qualification includes:

- Official name,
- Professional family,
- Spanish Level,
- Alphanumeric code.

The **general competence** of a professional qualification briefly describes the essential duties and functions of the professional.

The **professional environment** describes the professional field in which the activity is carried out, specifying the type of organizations, areas or services; the productive sectors, the occupations and related jobs.

The **Competence Units**:

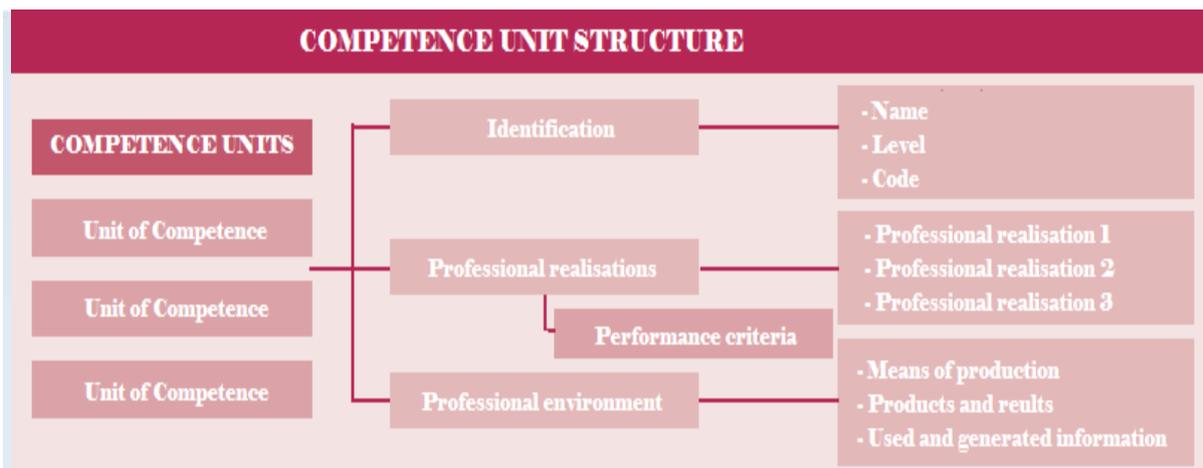
Each professional qualification is organized in Competence Units (CU). The competence unit is the minimum aggregate of professional competences liable to recognition, evaluation and partial accreditation.

The competence unit is expressed as professional realisations (PR) that establish the expected behaviour of a person in the form of consequences or results of the activities performed.

Each professional achievement is evaluable through a set of performance criteria (PA) that express the acceptable level of professional achievement to meet the objectives of productive organizations and constitute a guide for the evaluation of professional competence.

The whole of the competition takes place in a professional context in which the means of production, the products and results of the work, the information used and generated and all elements of a similar nature are considered necessary to frame the professional realisation.

Each unit of competence has associated a training module, which describes the training necessary to acquire that unit of competence.



Source: Arbizu, 2015, "Sistema Nacional de Cualificaciones y Formación Profesional. INCUAL

The Training Modules:

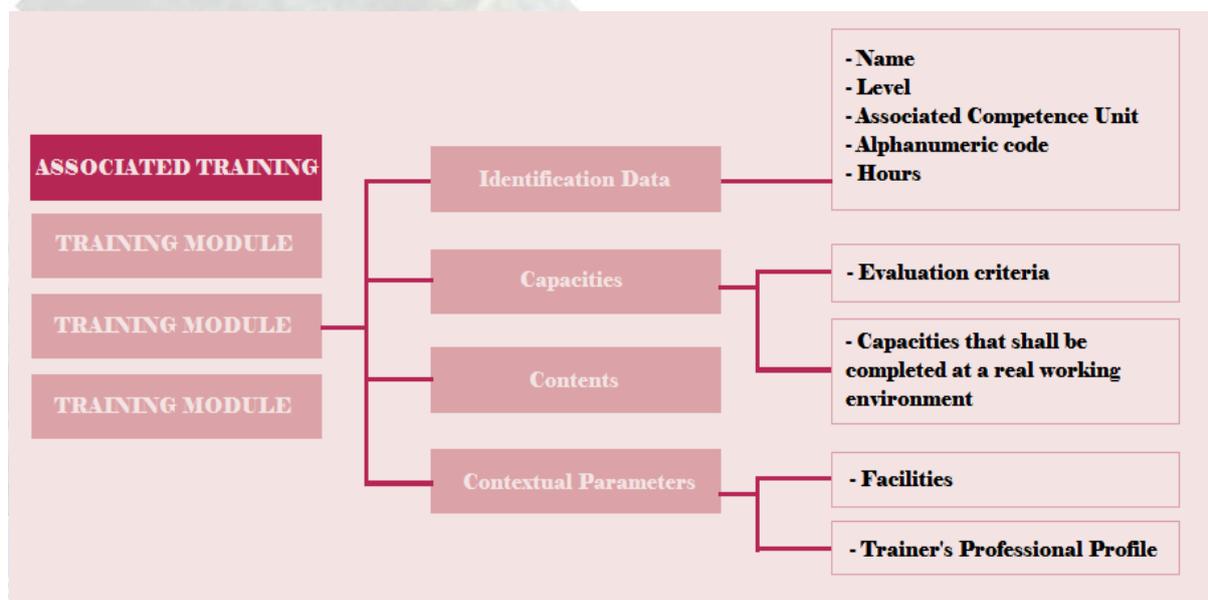
The training module is the coherent training block associated with each of the competency units that make up the qualification. Each training module has a standardised format that includes identification data and training specifications. These specifications will be included in the training offers, leading to the obtaining of vocational training certificates and professional certificates, referred to the Spanish National Catalogue of Professional Competences.

The training offers can be adapted to the duration of the training module according to the target group, the type of training, the number of students and other objective criteria.

The specifications of the training are expressed through the capacities and their corresponding evaluation criteria, as well as the contents that allow gaining those capacities, identifying those capacities whose acquisition must be completed in a real working environment.

Capabilities are the expression of expected results. Each capability corresponds to a set of evaluation criteria that delimit the scope, level and context in which capacity is to be assessed.

The specifications also include contextual parameters of the training, such as the dimension of workshops and facilities, **prescriptions on trainers** and others of this nature. These parameters will have a guiding character for the basic regulation regulating the training offers leading to vocational training certificates and certificates of professionalism.



Source: Arbizu, 2015, "Sistema Nacional de Cualificaciones y Formación Profesional. INCUAL

3.3.2. The Spanish Professional Qualifications related to PV Installer Trainers

1) The Professional Qualification for “Set-up and Maintenance of Solar Photovoltaic Systems”

Access to the official Professional Qualification

http://www.educacion.es/educa/incual/pdf/BDC/ENA261_2.pdf:

Identification	
Official name	Set-up and Maintenance of Solar Photovoltaic Systems (ES) Montaje y Mantenimiento de Instalaciones Solares Fotovoltaicas
Professional family	Energy and Water
Spanish Level	2
Alphanumeric code	ENA261_2

Competence	
Description	Carry out the installation, commissioning, operation and maintenance of solar photovoltaic installations complying with the applicable regulations.
Competence Units	UC0835_2: Rethinking solar photovoltaic systems UC0836_2: Set-up solar photovoltaic installations UC0837_2: Maintaining solar photovoltaic installations

Professional environment	
Professional environment	The professional develops his or her professional activity in the area of production dedicated to the assembly and maintenance of solar photovoltaic installations, in entities of public or private nature, companies of any size, both for its own account and for others, regardless of its legal form. The professional develops his or her activity depending functionally and / or hierarchically of a superior, if applicable. You can have staff in charge sometimes, seasonally or stably. Their professional activity is subject to regulation by the competent Administration. In the development of the professional activity, the principles of universal accessibility are applied in accordance with the applicable regulations.
Productive sectors	This professional is located in the energy sector, subsector of renewable energies, in the productive activities in which the assembly, operation and maintenance of photovoltaic installations for the production of electric energy is carried out.
Relevant Occupations and Jobs	Installers of photovoltaic solar systems Operators of solar photovoltaic installations Maintenance of solar photovoltaic installations

Competence Units	Training Module
UC0835_2: Rethinking solar photovoltaic systems	MF0835_2: Rethinking solar photovoltaic systems
UC0836_2: Set-up solar photovoltaic installations	MF0836_2: Set-up solar photovoltaic installations
UC0837_2: Maintaining solar photovoltaic installations	MF0837_2: Maintaining solar photovoltaic installations

Professional Realisations / Professional Tasks	
<p>Competence Unit 1:</p> <p>Rethinking solar photovoltaic systems</p>	<p>a) Rethink photovoltaic panels from the project or technical memory, complying with the applicable regulations for solar photovoltaic installations.</p> <p>b) Rethink solar photovoltaic installations connected to a network from a project or technical memory, complying with the applicable regulations for solar photovoltaic installations.</p> <p>c) Rethink solar photovoltaic installations isolated from a project or technical memory, complying with the applicable regulations for solar photovoltaic installations.</p> <p>d) Rethink the system of energy support in isolated installations from a project or technical memory to carry out their assembly, complying with the applicable regulation for solar photovoltaic installations.</p> <hr/> <p>PROFESSIONAL REALISATION A) <i>Rethink photovoltaic panels from the project or technical memory, complying with the applicable regulations for solar photovoltaic installations.</i></p> <p>CR 1.1 The type of photovoltaic panels to be installed as well as their functional characteristics and specifications are identified using the technical and administrative information derived from the project or technical report.</p> <p>CR 1.2 The location of the photovoltaic panels is based on the corresponding technical drawings and specifications.</p> <p>CR 1.3 The detected malfunctions between the project or technical memory and the location of the panels, are transmitted to the superior, proposing solutions if necessary.</p> <p>CR 1.4 The locations and anchoring characteristics, supports and connections of the components and construction elements are determined prior to their assembly.</p> <p>CR 1.5 The location of the panels is marked on the ground from the project or technical memory taking into account the characteristics of the place.</p> <p>CR 1.6 The affected work area is marked according to safety requirements and regulatory requirements.</p>
<p>Competence Unit 2:</p> <p>Set-up solar photovoltaic installations</p>	<p>a) Organize the assembly of supports, panels, storage system, support systems, monitoring systems, circuits and electrical and electronic equipment of solar photovoltaic installations according to the project and assembly program.</p> <p>b) Apply preventive, corrective and emergency measures, established in the safety plan, during the assembly of photovoltaic solar installations to avoid accidents and minimize risks.</p> <p>c) Set-up assemblies and panels, if necessary with a monitoring system, from plans and technical specifications, complying with the applicable regulations, for the installation of solar photovoltaic installations.</p> <p>d) Assemble storage / accumulation systems, based on plans and technical specifications, complying with the applicable regulations for the installation of solar photovoltaic installations.</p> <p>e) Assemble the circuits and electrical equipment, from plans and technical specifications, complying with the applicable regulations for the installation of solar photovoltaic installations.</p> <p>f) Set-up conventional generators, small power wind systems and other support systems, from plans and technical specifications, complying with the applicable regulations for the installation of solar photovoltaic installations.</p> <p>g) To put into service solar photovoltaic installations, from plans and technical specifications, checking their operation and complying with the applicable regulations.</p>
<p>Competence Unit 3:</p> <p>Maintaining solar photovoltaic installations</p>	<p>a) Organize the maintenance work of solar photovoltaic installations according to established intervention procedures.</p> <p>b) Apply preventive, corrective and emergency measures, established in the safety plan, during the maintenance of solar photovoltaic installations, to avoid accidents and minimize risks.</p> <p>c) Perform manoeuvring operations and preventive maintenance of solar photovoltaic installations based on plans, standards and technical specifications, to operate within the established parameters, complying with the applicable regulations.</p> <p>d) Perform corrective maintenance operations on solar photovoltaic installations, using instruction manuals and drawings, to restore functional conditions with established quality and safety.</p>

Professional environment (Example related to <i>UC0835_2: Rethinking solar photovoltaic systems</i> and extendible to all units of competence)	
Means of production	<p><u>Work tools, tools and measuring devices:</u> Equipment for movement of materials, cranes, hoists, winches, hydraulic jacks, tie rods, polymetric, clamp meter, tachometer, anemometer. Radiation meter. Compasses, surveying apparatus. Battery check. Densimeter. Battery charger. Inclinator. Low voltage electrical network checker. Photovoltaic solar system checker.</p> <p><u>Manual tools:</u> arc saw, fixed wrenches, marking tools, maces, level, wire strippers, welder, scissors, terminal tongs, drill, riveter and hoisting tools. Security equipments. Components of the installations: photovoltaic panels, supports, inverters, measurement equipment, control equipment, masts, gondolas, shovels, rotors, multipliers, batteries, conventional generators.</p>
Products and results	Installation of photovoltaic solar power operated and maintained.
Used and generated information	Projects, plans of assembly and cutting. Diagrams and diagrams of principle. List of parts and components. Assembly programs, parts of work. Technical specifications. Map of solar trajectories. Traditional and digitized cartography Catalogs. Service and use manuals. Assembly and operating instructions. Maintenance protocols. Maintenance parts. Databases. Software. Parts and reports of inspection and repair. Internal working rules. Applicable safety regulations and photovoltaic solar installations.

Training Module 1: Rethinking solar photovoltaic systems	
Spanish Level	2
Code	MF0835_2
Associated Competence Unit	Rethinking solar photovoltaic systems
Duration	120h
Capacities / Skills	<p>C1: Analyze the most relevant functions, laws and rules of electricity, describing the functionality of the elements and electrical assemblies present in solar photovoltaic installations.</p> <p>C2: Analyze the operation of photovoltaic solar installations connected to grid to determine their characteristics and elements related to its and assembly</p> <p>C3: Analyze the operation of isolated photovoltaic solar installations and their support systems to determine their characteristics and elements related to its rethinking and assembly.</p> <p>C4: To interpret projects and technical memories of solar photovoltaic installations connected to network to carry out rethinking operations and others related to its assembly.</p> <p>C5: Interpret projects and technical memories of isolated photovoltaic solar installations with support systems to carry out rethinking operations and others related to their assembly.</p>
Evaluation criteria (Example extendible to all capacities / skills)	<p>CAPACITY / SKILL A) <i>Analyze the most relevant functions, laws and rules of electricity, describing the functionality of the elements and electrical assemblies present in solar photovoltaic installations.</i></p> <p>CE1.1 Explain the laws and rules applicable to the analysis and resolution of electrical circuits, identifying the magnitudes and characteristic units of electricity.</p> <p>CE1.2 Explain the processes of transformation, rectification and accumulation of electricity.</p> <p>CE1.3 Describe the constitution and functioning of distribution lines and their protection systems.</p> <p>EC1.4 Describe the main applications of electricity, as well as the constitution and operation of characteristic receivers and their</p>

Training Module 1: Rethinking solar photovoltaic systems

regulatory systems.
 CE1.5 Explain the characteristics of the measurement systems of the electrical parameters.
 CE1.6 Identify the graphic symbology of electrical schematics, interpreting the relationship between the partial schemas of the system under consideration.
 CE1.7 Describe the measures of prevention of risks and security related to the use of electricity.

- Capacities / Skills to be acquired in a real working environment**
- Be responsible for the work you do.
 - Demonstrate a good professional doing.
 - Propose alternatives with the objective to improve results.
 - Maintain the work area with the degree of order and cleanliness required by the organization.
 - Participate and collaborate actively in the work team.
 - Interpret and execute working instructions.

Contents / Knowledge

1. General electrical engineering related to solar photovoltaic installations
 Nature of electricity. Properties and applications. Electric current. Electrical magnitudes.
 Magnetism and electromagnetism.
 Electrical circuits. Structure and components. Symbology and graphic representation.
 Circuit analysis.
 Protection systems. Batteries and accumulators. Classification, typology and characteristics.
 Main electronic components. Typology and functional characteristics. Photovoltaic effect. Systems
 Three-phase electric. Static and rotary electric machines. Typology and characteristics.
 Generators, transformers and motors. Load regulators. Investors.
 Measures of electrical magnitudes. Procedures. Measuring instruments. Errors in measure.
 Electrical safety.

2. General operation of solar photovoltaic systems
 Global operation and configuration of a photovoltaic solar installation connected to grid.
 Global operation and configuration of an isolated photovoltaic solar installation.
 Storage and accumulation.
 Global operation and configuration of a support installation with small wind turbine generator.
 Systems of protection and safety in the operation of the installations.
 Specifications and description of equipment and constituent elements: panels, supports, followers
 Solar and anchors, inverters, accumulators, small wind turbines, generators
 Regulating and control equipment, measuring and protection equipment.
 Applicable regulations.

3. Symbolic representation of solar photovoltaic installations
 Sketched system. Perspective. Electrical simbol.
 Representation of electrical circuits.
 Single-stranded and multi-stranded scheme.
 Functional symbolic diagrams and diagrams.

4. Projects and Technical Memories of Photovoltaic Solar Installations
 Concept and types of projects and technical memories. Memory, plans, budget, specifications
 And safety and health study.
 Plans of situation. Detail and set plans. Diagrams, flowcharts and schedules.
 Procedures and operations of stakeout of the facilities.
 Computer equipment in representation and assisted design. Assisted Design

Training Module 1: Rethinking solar photovoltaic systems	
	Programs. Display and Interpretation of digitized plans. Basic operations with graphic files.
Contextual Parameters	<p>Facilities</p> <p>The spaces and facilities will respond, in the form of classroom, classroom-workshop, practice workshop, laboratory or singular space, to the training needs, in accordance with the Professional Context established in the Associated Competence Unit, taking into account the applicable regulations Of the productive sector, risk prevention, occupational health, universal accessibility and environmental protection.</p> <hr/> <p>Trainer's professional profile</p> <p>1. Knowledge of the knowledge and skills related to the rethinking of solar photovoltaic installations, which will be accredited in one of two ways:</p> <ul style="list-style-type: none"> – Level 2 academic training (Spanish Qualifications Framework for Higher Education), Technical Engineering or other higher level related to the professional field. – Professional experience of a minimum of 3 years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>

Training Module 2: Set-up of photovoltaic solar systems	
Spanish Level	2
Code	MF0836_2
Associated Competence Unit	UC0836_2: Set-up solar photovoltaic installations
Duration	270h
Capacities / Skills	<p>C1: Elaborate work plans for the mechanical and electrical assembly of solar photovoltaic installations according to the projects or technical memories and the established working procedures.</p> <p>C2: Analyze the prevention and safety measures regarding the mechanical and electrical assembly of solar photovoltaic installations contained in the safety plans of the companies in the sector.</p> <p>C3: To carry out operations of assembly of structures of solar installations from the technical documentation, using the tools, equipment and suitable materials and acting under safety standards.</p> <p>C4: Perform mechanical and electrical assembly operations and commissioning of photovoltaic solar installations from the technical documentation, using the tools, equipment and suitable materials and acting under safety standards.</p>
Capacities / Skills to be acquired in a real working environment	<ul style="list-style-type: none"> – Finish the work according to criteria of suitability, speed, economy and efficiency. – Recognize the productive process of the organization. – Comply with the production standards set by the organization. – Maintain the work area with the degree of order and cleanliness required by the organization. – Participate and collaborate actively in the work team. – Interpret and execute working instructions.
Contents / Knowledge	<p>1. Installation of solar photovoltaic panels</p> <p>Classification of electrical power supply facilities.</p> <p>Measurement of electrical magnitudes.</p> <p>Routes and general protection panels. Protections. Types and characteristics.</p> <p>Pipelines and pipelines. Drivers.</p> <p>Electrical and electronic equipment for protection, maneuvering and safety.</p> <p>Motorization and automatic solar tracking system.</p> <p>Types of panels. Specifications.</p> <p>Grouping and connection systems. Orientation and inclination. Shades. Solar tracking.</p>

Training Module 2: Set-up of photovoltaic solar systems

2. Structures of subjection of photovoltaic solar installations

Civil works: displacement and hoisting of equipment and materials. Types of efforts. Elementary calculus of Efforts. Resistant structures. Types. Materials. Supports and anchors. Resistance of the constructive elements. Waterproofing. Architectural and urban integration. Aesthetics and technique. Structures of monitoring systems. Structures of accumulation systems. Structures of Wind systems. Conventional generator sets.

3. Assembly of circuits and electrical equipment of solar photovoltaic installations

Determination and selection of equipment and elements necessary for the assembly from the planes of the installation. Organization of the assembly of circuits and electrical and electronic equipment of solar installations Photovoltaic. Techniques and procedures. Assembly of circuits and electrical equipment of solar photovoltaic installations. Assembly of circuits and electrical and electronic equipment of wind and generator support systems. Assembly of circuits and equipment Electrical and electronic accumulation systems. Interconnection of the different subsystems of solar photovoltaic installations. Tools and means used in the assembly. Techniques of utilization.

4. Quality in the assembly of solar photovoltaic installations

Quality in the assembly. Technical prescriptions and quality control sheets. Quality control of materials used in assembly. Quality in assembly operations. Basic economic and strategic aspects of quality. Processes of technical documentation of the quality. Procedures manual.

5. Safety in the installation of solar photovoltaic installations

Security plans in the assembly of solar photovoltaic installations. Prevention of professional risks in solar photovoltaic installations. Risks arising from monitoring systems. Risks derived from accumulation systems. Risks arising from wind support systems. Work areas. Security signage. Emergencies. Evacuation. First aid.

Contextual Parameters

Facilities

The spaces and facilities will respond, in the form of classroom, classroom-workshop, practice workshop, laboratory or singular space, to the training needs, in accordance with the Professional Context established in the Associated Competence Unit, taking into account the applicable regulations Of the productive sector, risk prevention, occupational health, universal accessibility and environmental protection.

Trainer's professional profile

1. Mastery of knowledge and techniques related to the set-up and assembly of solar installations Photovoltaic, which will be accredited in one of two ways:
 - Level 2 academic training (Spanish Qualifications Framework for Higher Education), Engineering
 - Technique or of others of superior level related to the professional field.
 - Professional experience of a minimum of 3 years in the field of competences related to this
 - Training module.
2. Pedagogical competence accredited according to what the competent Administrations establish.

Training Module 3: Maintaining solar photovoltaic installations	
Spanish Level	2
Code	MF0837_2
Associated Competence Unit	UC0837_2: Maintaining solar photovoltaic installations
Duration	60
Capacities / Skills	<p>C1: Analyze the general operation of photovoltaic solar installations to develop the maintenance plan.</p> <p>C2: Analyze the prevention, safety and environmental protection measures regarding the maintenance of solar photovoltaic installations contained in the safety plans of the companies in the sector.</p> <p>C3: Perform preventive maintenance operations of photovoltaic solar installations following the procedures and specifications of the maintenance plan of the installation.</p> <p>C4: Perform corrective maintenance of photovoltaic solar installations according to established procedures to return them to their operating state within the established parameters.</p>
Capacities / Skills to be acquired in a real working environment	<ul style="list-style-type: none"> – Demonstrate some autonomy in the resolution of small contingencies related to their activity. – Recognize the productive process of the organization. – Comply with the production standards set by the organization. – Maintain the work area with the degree of order and cleanliness required by the organization. – Interpret and execute working instructions. – Respect the internal procedures and standards of the organization.
Contents / Knowledge	<p>1. Maintenance of solar photovoltaic installations General operation of a solar photovoltaic installation. Procedures and operations for taking measures. Checking and adjusting parameters to setpoints. Maintenance programs for solar photovoltaic installations. Manuals. Projects. Inspection and verification of mechanical installations. Inspection and verification of electrical installations. Critical faults. Regulation of application in the maintenance of photovoltaic solar installations.</p> <p>2. Mantenimiento preventivo de instalaciones solares fotovoltaicas Programa de mantenimiento preventivo. Programa de gestión energética. Seguimiento de energía generada. Evaluación de rendimientos. Operaciones mecánicas en el mantenimiento de instalaciones. Operaciones eléctricas de mantenimiento de circuitos. Equipos y herramientas usuales. Procedimientos de limpieza, engrase, relleno de fluidos electrolíticos, para elementos de las instalaciones auxiliares.</p> <p>3. Corrective maintenance of solar photovoltaic installations Troubleshooting. Procedures for electrically isolating the different components. Methods for the repair of the different components of the installations. Disassembly and repair or replacement of electrical and mechanical elements.</p> <p>4. Quality in the maintenance of solar photovoltaic installations Quality in maintenance. Technical prescriptions and quality control sheets. Quality tools applied to the improvement of maintenance operations. Technical documentation of quality. Reports and control parts. Maintenance manual.</p> <p>5. Safety in maintenance Security plans in the maintenance of solar photovoltaic installations. Prevention of professional risks in the field of maintenance of solar photovoltaic installations.</p>

Training Module 3: Maintaining solar photovoltaic installations	
	Means and safety equipment. Personal protective equipment. Use and maintenance. Prevention and environmental protection. Emergencies. Evacuation. First aid. Work areas. Security signage. Application regulations.
Contextual Parameters	Facilities The spaces and facilities will respond, in the form of classroom, classroom-workshop, practice workshop, laboratory or singular space, to the training needs, in accordance with the Professional Context established in the Associated Competence Unit, taking into account the applicable regulations Of the productive sector, risk prevention, occupational health, universal accessibility and environmental protection.
	Trainer's professional profile 1. Knowledge of the knowledge and techniques related to the maintenance of solar photovoltaic installations, which will be accredited in one of two ways: <ul style="list-style-type: none"> – Level 2 academic training (Spanish Qualifications Framework for Higher Education), Technical Engineering or other higher level related to the professional field. – Professional experience of a minimum of 3 years in the field of competences related to this training module. 2. Pedagogical competence accredited according to what the competent Administrations establish.

2) The Professional Qualification for “Teaching of Training for Employment”

Access to the official Professional Qualification
(http://www.educacion.es/educa/incual/pdf/BDC/SSC448_3.pdf):

Identification	
Official name	Teaching of Training for Employment (ES) Docencia de la Formación para el Empleo
Professional family	Socio-cultural and Community Services
Spanish Level	3
Alphanumeric code	SSC448_3

Competence	
Description	To program, to impart, to tutor and to evaluate formative actions of the subsystem of professional formation for the employment, elaborating and using materials, means and didactic resources, orienting on the formative itineraries and professional exits offered by the labour market in its specialty, promoting in a permanent form the quality of training and didactic updating.
Competence Units	UC1442_3: Programming training actions for employment, adapting them to the characteristics and conditions of the training, the profile of the recipients and the work reality. UC1443_3: Select, elaborate, adapt and use materials, means and didactic resources for the development of training contents. UC1446_3: Provide information and job guidance and promote the quality of vocational training for employment. UC1445_3: Evaluate the teaching-learning process in the training actions for employment. UC1444_3: Provide and tutor training actions for employment using techniques, strategies and didactic resources.

Professional environment	
Professional environment	The professional develops his/her professional activity in the public and private, in centres or entities that impart vocational training for the use, for workers in active, in situation of unemployment, as well as to special groups. Their professional performance is carried out in companies, organizations and entities of a public or private nature, that impart training for their own account or for others. In the development of professional activity, the principles of universal accessibility are applied in accordance with current legislation.
Productive sectors	It is located in all productive sectors, in the areas of vocational training for employment, either in the training offered by the competent departments, in demand or in alternation with employment, and other accompanying actions and support for training, or Within non-formal teachings.
Relevant Occupations and Jobs	Non-regulated trainer. Trainer of non-regulated occupational training. Occupational trainer. Trainer for employment.

Competence Units	Training Module
UC1442_3: Programming training actions for employment, adapting them to the characteristics and conditions of the training, the profile of the recipients and the work reality.	MF1442_3: Didactic programming of training actions for employment. (60h)
UC1443_3: Select, elaborate, adapt and use materials, means and didactic resources for the development of training contents.	MF1443_3: Selection, preparation, adaptation and use of materials, resources and didactic resources in vocational training for employment (90 h)
UC1446_3: Provide information and job guidance and promote the quality of vocational training for employment.	MF1446_3: Labor orientation and promotion of quality in vocational training for employment (30 h)
UC1445_3: Evaluate the teaching-learning process in the training actions for employment.	MF1445_3: Evaluation of the teaching-learning process in vocational training for employment (60 h)
UC1444_3: Provide and tutor training actions for employment using techniques, strategies and didactic resources.	MF1444_3: Teaching and tutoring of training actions for employment (120 h)

Professional Realisations / Professional Tasks	
Competence Unit 1: Programming training actions for employment, adapting them to the characteristics and conditions of the training, the	<p>C1: Analyze the regulations related to Vocational Training for employment that determines the type of training to be developed, identifying the characteristics and preconditions to consider when preparing the programming.</p> <p>C2: Coordinate with the rest of the team, technical and professional training for the development of the training action.</p> <p>C3: Elaborate didactic programs that reflect their elements (objectives, contents, learning activities, methodology, resources, timing, and evaluation) to develop the training action.</p> <p>C4: Elaborate schedules for the training sessions, sequencing the contents and activities.</p>

Professional Realisations / Professional Tasks	
<p>profile of the recipients and the work reality.</p> <p>Performance criteria (Example extendible to all professional realisations)</p>	<p>PROFESSIONAL REALISATION A) <i>Analyze the regulations related to Vocational Training for employment that determines the type of training to be developed, identifying the characteristics and preconditions to consider when preparing the programming.</i></p> <p>CR 1.1 The regulation is identified to apply it in function of the formative action to be developed directing the programming of the same.</p> <p>CR 1.2 The preconditions of the training action are defined at the beginning of the process to guide didactic programming.</p> <p>CR 1.3 The professional profile and the training needs of the beneficiaries of the training action are identified and analyzed so that they are reflected in the didactic program.</p>
<p>Competence Unit 2:</p> <p>Select, elaborate, adapt and use materials, means and didactic resources for the development of training contents.</p>	<p>a) To select materials, means and didactic resources in function of the learning objectives and the formative modality to facilitate the formative action.</p> <p>b) To elaborate and adapt didactic materials and resources according to technical and methodological criteria to favor the teaching and to facilitate the learning of the formative contents.</p> <p>c) Use materials, resources and didactic resources adapting them to the context and attending to methodological and accessibility criteria for the use of the training action.</p>
<p>Competence Unit 3:</p> <p>Provide information and job guidance and promote the quality of vocational training for employment.</p>	<p>a) Collect information on the reality of work and the professional context to convey real employment opportunities according to the training action.</p> <p>b) To promote the active role and responsibility of the target student of the training action taking into account their personal skills, techniques and their work experience to involve him in the learning process.</p> <p>c) Inform and advise the student of the training action on the training itineraries and professional exits in their professional specialty, individually and personally to guide the election.</p> <p>d) Identify strategies to improve the quality of training processes to be applied in training actions.</p>
<p>Competence Unit 4:</p> <p>Evaluate the teaching-learning process in the training actions for employment.</p>	<p>a) To carry out an initial diagnosis of the formation of the students, elaborating and applying evaluation instruments in order to adapt the contents to the educational level of the same ones.</p> <p>b) To verify during the development and at the end of the training action the level of acquisition of professional competences by developing and applying evaluation tools to provide guidance on the acquisition of simple and complex learning in order to help each student achieve and improvement.</p> <p>c) Make a final evaluation of the training action, which allows obtaining information to modify those aspects of programming that require it.</p>
<p>Competence Unit 5:</p> <p>Provide and tutor training actions for employment using techniques, strategies and didactic resources.</p>	<p>a) To establish conditions that favor the development of the learning process for the delivery of training actions.</p> <p>b) To deliver training contents of the program, using techniques, didactic strategies, resources and didactic materials according to the type of training action in order to facilitate the acquisition of professional skills.</p> <p>c) Propose, streamline and supervise learning activities using active methodologies to encourage the development of professional and social skills.</p> <p>d) Advise the students in the use of learning strategies and use of information sources that facilitate the development of the training action for the acquisition of professional skills.</p>

Professional environment (Example related to UC1445_3: <i>Evaluate the teaching-learning process in the training actions for employment, and extendible to all units of competence</i>)	
Means of production	Tools for evaluating theoretical, practical and professional knowledge. Monitoring and evaluation sheets. Development of evaluation learning activities. Means and didactic resources as supports to the didactic action.
Products and results	Initial diagnosis of student training. Adequacy of contents to the level of training of the same, checking the level of learning during development, and in the end, the training action. Development and application of diagnostic, continuous, final and procedural evaluation instruments. Proposed guidance on learning acquisition. Indicators of formative quality. Self-assessment instruments of students.
Used and generated information	Didactic documentation. Evaluation reports. Theory, practical and attitudinal evaluation tests. Specific bibliography. Self-assessment and hetero-evaluation tools and procedures. information and training resources available in the network. Log sheets. Student Satisfaction Questionnaires.

Training Module 1: Didactic programming of training actions for employment.	
Spanish Level	3
Code	MF1442_3
Associated Competence Unit	Programming training actions for employment, adapting them to the characteristics and conditions of the training, the profile of the recipients and the work reality.
Duration	60h
Capacities / Skills	<p>C1: Analyze the regulations on Vocational Training for employment identifying their characteristics and target groups.</p> <p>C2: Apply techniques of teamwork in relation to technical and professional training for the development of training actions.</p> <p>C3: To elaborate the didactic program of a formative action differentiating its constituent elements.</p> <p>C4: Program timed educational units sequencing contents and activities.</p>
Evaluation criteria (Example extendible to all capacities / skills)	<p>CAPACITY / SKILL A) <i>Analyze the regulations on Vocational Training for employment identifying their characteristics and target groups.</i></p> <p>CE1.1 To collect from the regulations data referring to the preconditions of the training action to be developed, in order to guide the didactic programming.</p> <p>CE1.2 Identify the characteristics of the certificate of professionalism or training program, analyzing the professional and formative referent of the modules or, where appropriate, formative units to be programmed.</p> <p>CE1.3 Identify procedures that delimit the needs and interests of the recipients of the training action, as well as their previous experience and training.</p> <p>CE1.4 Define means of linking data obtained from students with the elaboration of didactic programming.</p>
Capacities / Skills to be acquired in a real working environment	<p>Teamwork and cooperation.</p> <p>Propose alternatives with the aim of improving learning outcomes.</p> <p>Demonstrate cordiality, kindness and a conciliatory and sensitive attitude to others.</p> <p>Demonstrate interest in the broad knowledge of the organization and its processes.</p> <p>Adapt to the organization by integrating into the system of technical – professional relations.</p> <p>Transmit information clearly, in an orderly, structured and accurate manner.</p>

Training Module 1: Didactic programming of training actions for employment.		
Contents / Knowledge	<p>1. Structure of vocational training for employment Subsystem of Vocational Training for Employment: characteristics and recipients. Supply training. Demand training and alternation for employment. Certificates of professionalism, training modules and training units: characteristics, structure. Training programs. Professional itinerary. National Qualifications System: professional qualifications.</p> <p>2. The didactic programming of training for employment Elements of didactic programming: objectives, didactic units, contents, methodology, timing, evaluation, materials and resources. The objectives: definition, functions, classification, formulation and drafting rules. The formative contents: typology. Criteria to differentiate the contents. Writing rules. Techniques for the sequencing of contents. Learning activities: typology, structure and writing criteria. Methodology for training: didactic methods and techniques. Means and didactic resources. Evaluation: typology, criteria and instruments.</p> <p>3. Timed planning in training for employment Didactic script, structure and contents. Systematization of information. Sequencing.</p>	
Contextual Parameters	Facilities	Multipurpose room of a minimum of 2 m ² per student or student.
	Trainer's professional profile	<p>1. Knowledge of the skills and techniques related to the programming of training actions for employment, adapting them to the characteristics and conditions of the training, the profile of the beneficiaries and the reality of the job, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>

Training Module 2: Selection, preparation, adaptation and use of materials, resources and didactic resources in vocational training for employment.	
Spanish Level	3
Code	MF1443_3
Associated Competence Unit	Select, elaborate, adapt and use materials, means and didactic resources for the development of training contents.
Duration	90h
Capacities / Skills	<p>C1: Apply criteria of selection of materials, means and didactic resources in function of the formative actions.</p> <p>C2: Elaborate didactic materials that favor the acquisition of learning.</p> <p>C3: Use materials, means and didactic resources according to technical specifications, safety and environmental health standards, according to a training context.</p>
Capacities / Skills to be acquired in a real working environment	<p>Teamwork and cooperation.</p> <p>Propose alternatives with the aim of improving learning outcomes.</p> <p>Demonstrate cordiality, kindness and a conciliatory and sensitive attitude to others.</p> <p>Demonstrate interest in the broad knowledge of the organization and its processes.</p> <p>Adapt to the organization by integrating into the system of technical – professional relations.</p> <p>Transmit information clearly, in an orderly, structured and accurate manner.</p>
Contents /	1. Materials, means and didactic resources in the training actions for employment.

Training Module 2: Selection, preparation, adaptation and use of materials, resources and didactic resources in vocational training for employment.		
Knowledge	<p>Differences between media and didactic resources. Printed material: characteristics and types. Didactic guide. Slate and flipchart: characteristics, types. The overhead projector: features, types. Transparency The video: features and types. The multimedia projector: features and types. Computer applications: multimedia presentation, virtual simulator, among others. Internet: tools and utilities.</p> <p>2. Elaboration and adaptation of materials, means and didactic resources in training for employment</p> <p>Rules on intellectual property. Standards of elaboration. Design and adaptation of materials, means and didactic resources. Preparation of didactic script for different supports.</p> <p>3. Didactic use of materials, resources and resources in training for employment</p> <p>Standards of use in the classroom: printed material, blackboard, flipchart, overhead projector, video, projector Multimedia, computer applications and the Internet. The multimedia presentation: elements, functions and environmental conditions. Keys to make an effective presentation: structure and didactic use.</p>	
Contextual Parameters	Facilities	<p>Multipurpose room of a minimum of 2 m² per student or student.</p> <p>1. Knowledge of the knowledge and techniques related to the selection, preparation, adaptation and use of materials, resources and didactic resources, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>
	Trainer's professional profile	

Training Module 3: Labour orientation and promotion of quality in vocational training for employment.	
Spanish Level	3
Code	MF1446_3
Associated Competence Unit	Provide information and job guidance and promote the quality of vocational training for employment.
Duration	30h
Capacities / Skills	<p>C1: Define information channels for the identification of professional contexts that facilitate decision making in processes of insertion or professional promotion.</p> <p>C2: To encourage the active participation of each student in his process of information and professional orientation.</p> <p>C3: To elaborate procedures of transmission and advice on the professional and productive environment that make possible the updating of the information.</p> <p>C4: Plan professional updating procedures and innovation strategies, specifying pathways and exchange learning activities with other professionals.</p> <p>C5: Select methodological strategies that contribute to improving the quality of the learning process.</p>
Capacities / Skills to be acquired in a real working environment	<p>Initiative.</p> <p>Teamwork and cooperation.</p> <p>Propose alternatives with the objective to improve results.</p> <p>Demonstrate cordiality, kindness and a conciliatory and sensitive attitude to others.</p> <p>Demonstrate interest in the broad knowledge of the organization and its processes.</p> <p>Adapt to the organization by integrating into the system of technical – professional relations.</p> <p>Transmit information clearly, in an orderly, structured and accurate manner.</p>

Training Module 3: Labour orientation and promotion of quality in vocational training for employment.					
Contents / Knowledge	<p>1. Professional orientation in training actions for employment Professional and work profile: professional working environment. Functional and technological environment. Professional experience. Professional skills and abilities. Personal, aptitudinal and attitudinal characteristics. Knowledge and interests. The techniques of job search and self-employment: tools. Professional itinerary of employment and training: personal, professional and psychosocial indicators. Professional outings. Statistical information on the labour market. Fields of employment of the specialty. Databases for obtaining addresses of companies in the sector Documentation and specialized magazines.</p> <p>2. Quality in training for employment: definition and areas Tools and techniques for quality improvement. Follow-up plan: concept, characteristics and purpose. Agents involved. Coordination actions. Strategies for improvement. Schedule. Evaluation procedures. The labour market: impact of the new technologies of the specialty. Analysis of relevant data. Professional exchange: meetings, seminars, congresses, associations and professional networks. Professional innovation: innovation and change strategies. Sources of information for technical and pedagogical updating.</p>				
Contextual Parameters	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="background-color: #e6f2ff;">Facilities</td> <td>Multipurpose room of a minimum of 2 m² per student.</td> </tr> <tr> <td style="background-color: #e6f2ff;">Trainer's professional profile</td> <td> <p>1. Knowledge and skills related to vocational guidance and quality promotion in vocational training for employment, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p> </td> </tr> </table>	Facilities	Multipurpose room of a minimum of 2 m ² per student.	Trainer's professional profile	<p>1. Knowledge and skills related to vocational guidance and quality promotion in vocational training for employment, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>
Facilities	Multipurpose room of a minimum of 2 m ² per student.				
Trainer's professional profile	<p>1. Knowledge and skills related to vocational guidance and quality promotion in vocational training for employment, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>				

Training Module 4: Evaluation of the teaching-learning process in vocational training for employment.	
Spanish Level	3
Code	MF1445_3
Associated Competence Unit	Evaluate the teaching-learning process in the training actions for employment.
Duration	60
Capacities / Skills	<p>C1: Analyze the purpose and types of evaluation that facilitate the adequacy of the training level to the profile of the students.</p> <p>C2: Elaborate tests and evaluation instruments with objective criteria, providing the guidelines for their use in a training action.</p> <p>C3: Elaborate criteria and select evaluation indicators that determine the level of learning achieved by the students of the training action and provide information on the training process.</p>
Capacities / Skills to be acquired in a real working environment	<p>Initiative.</p> <p>Teamwork and cooperation.</p> <p>Propose alternatives with the objective to improve results.</p> <p>Demonstrate cordiality, kindness and a conciliatory and sensitive attitude to others.</p> <p>Demonstrate interest in the broad knowledge of the organization and its processes.</p> <p>Adapt to the organization by integrating into the system of technical – professional relations.</p> <p>Transmit information clearly, in an orderly, structured and accurate manner.</p>

Training Module 4: Evaluation of the teaching-learning process in vocational training for employment.		
Contents / Knowledge	<p>1. Assessment of learning in training for employment Evaluation: concept, modalities. Standard and criterion. Types of evaluation. Technical characteristics of the evaluation: reliability, validity. Evaluation tools and techniques according to results and types of learning: Knowledge tests: evaluation of simple learning. Table of specifications. Types of items and rules of elaboration and correction. Instructions for the application of the tests. Evaluation of complex learning: interpretative exercise, test tests. Rules for the elaboration and correction of complex learning tests. Practice tests: check lists, rating scales, practice evaluation sheets: Criteria for preparation and correction, instructions for the application of tests.</p> <p>2. Evaluation of the training process for employment Evaluation criteria and indicators. Qualitative and quantitative techniques for collecting information. Observation and registration sheet: rules of elaboration and use. Rules for the preparation of questionnaires. Tracking sheets. Reports of monitoring and evaluation of training actions and training units. Follow-up plan: elements, characteristics, improvement and reinforcement strategies. Quality control and evaluation: effectiveness, effectiveness and efficiency.</p>	
Contextual Parameters	Facilities	Multipurpose room of a minimum of 2 m ² per student 1. Mastery of the knowledge and techniques related to the evaluation of the teaching-learning process in vocational training for employment, which will be accredited in one of the following ways: <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. 2. Pedagogical competence accredited according to what the competent administrations establish.
	Trainer's professional profile	

Training Module 5: Teaching and mentoring of training actions for employment.	
Spanish Level	3
Code	MF1444_3
Associated Competence Unit	Provide and tutor training actions for employment using techniques, strategies and didactic resources.
Duration	120h
Capacities / Skills	C1: To establish strategies that facilitate the learning of adults, prior to the formative action. C2: Generate channels for the active participation of students in the development of training actions. C3: Select communication techniques that are applicable in the training action. C4: Analyze methodological strategies that favour the acquisition of professional skills. C5: Determine tools to monitor the student learning process by providing personalized help strategies when needed.
Capacities / Skills to be acquired in a real working environment	Initiative. Teamwork and cooperation. Propose alternatives with the objective to improve results. Demonstrate cordiality, kindness and a conciliatory and sensitive attitude to others. Demonstrate interest in the broad knowledge of the organization and its processes. Adapt to the organization by integrating into the system of technical – professional relations. Transmit information clearly, in an orderly, structured and accurate manner.

Training Module 5: Teaching and mentoring of training actions for employment.

<p>Contents / Knowledge</p>	<p>1. Psychopedagogical aspects of apprenticeship in vocational training for employment The teaching-learning process in the formation of adults: concept, elements. The teacher and the student: functions, characteristics. Learning: concept, characteristics, types. Learning triggers: attention, memory Motivation: process, actions and techniques. The theory of communication and the learning process. The process of communication. Interferences and barriers in communication. Training as a communicative process. Verbal and non-verbal communication in the formative process. The dynamics of learning in the group: characteristics, types, phases of group development. The address of the group. Group techniques.</p> <p>2. Methodological strategies in vocational training for employment Teaching methods: concept. Methodological strategies. Elements influencing the choice of methodological strategy: learning outcomes, learning group, contents, resources, organization. Autonomous learning strategies. Teaching skills. Didactic styles. Teaching functions. The training session: structure, characteristics of the didactic exhibition, use of materials, resources and resources. The teaching simulation: micro-teaching and autoscopy.</p> <p>3. Modalities of vocational training for employment Characteristics and types: face-to-face, distance learning, teletraining and mixed. Communication on line. The role of the tutor and his / her roles: active, proactive and reactive. Functions. Organization and planning of actions. Coordination of groups. Search for solutions. Supervision and monitoring of learning. Tutorial skills. Criteria for the timing of the tutorial action. Individualized action plan.</p>
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<p>Contextual Parameters</p>	<table border="1"> <tr> <td data-bbox="442 1151 667 1189"> <p>Facilities</p> </td> <td data-bbox="667 1151 1388 1189"> <p>Multipurpose room of a minimum of 2 m² per student⁹¹</p> </td> </tr> <tr> <td data-bbox="442 1317 667 1413"> <p>Trainer's professional profile</p> </td> <td data-bbox="667 1218 1398 1507"> <p>1. Mastery of the knowledge and techniques related to the teaching and tutoring of training actions, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p> </td> </tr> </table>	<p>Facilities</p>	<p>Multipurpose room of a minimum of 2 m² per student⁹¹</p>	<p>Trainer's professional profile</p>	<p>1. Mastery of the knowledge and techniques related to the teaching and tutoring of training actions, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>
<p>Facilities</p>	<p>Multipurpose room of a minimum of 2 m² per student⁹¹</p>				
<p>Trainer's professional profile</p>	<p>1. Mastery of the knowledge and techniques related to the teaching and tutoring of training actions, which will be accredited in one of the following ways:</p> <ul style="list-style-type: none"> – Academic training of Diplomate, equivalent degree or other higher level degree related to this professional field. – Professional experience of a minimum of three years in the field of competences related to this training module. <p>2. Pedagogical competence accredited according to what the competent Administrations establish.</p>				

3.3.3. Summary of the competence requirements for a PV trainers in Spain

The table prepares the summary list of competence requirements for a **PV installer in Spain**.

Table 3.20. The summary list of competence requirements for a PV installer in Spain

	Spanish Organic Law 5/2002	Professional competences standard
Synthesis		Carry out the installation, commissioning, operation and maintenance of solar photovoltaic installations complying with the applicable regulations.
Professional tasks		UC0835_2: Rethinking solar photovoltaic systems UC0836_2: Set-up solar photovoltaic installations UC0837_2: Maintaining solar photovoltaic installations
The job description and the manner of its execution, the areas of the profession occurrence		This professional is located in the energy sector, subsector of renewable energies, in the productive activities in which the assembly, operation and maintenance of photovoltaic installations for the production of electric energy is carried out.
Work environment (working conditions, machinery and tools, risks, work organization)		The professional develops his or her professional activity in the area of production dedicated to the assembly and maintenance of solar photovoltaic installations, in entities of public or private nature, companies of any size, both for its own account and for others, regardless of its legal form. The professional develops his or her activity depending functionally and / or hierarchically of a superior, if applicable. You can have staff in charge sometimes, seasonally or stably. Their professional activity is subject to regulation by the competent Administration. In the development of the professional activity, the principles of universal accessibility are applied in accordance with the applicable regulations.
Psychophysical and health requirements, including contraindications to professional practice	-	-
Education and powers necessary to work in the profession	<p>The professional should accredit the qualification "Set-up and Maintenance of Solar Photovoltaic Systems". There are two ways of obtaining the professional qualification:</p> <ol style="list-style-type: none"> 1. Through obtaining a VET Diploma 2. Through professional evaluation and accreditation <p>Citizens wishing to participate in the procedure of professional evaluation and accreditation must meet the following requirements:</p> <ol style="list-style-type: none"> a) Possess the Spanish nationality, having obtained the certificate of registration of community citizenship or the family card of a citizen or citizen of the Union, or holding a residence permit or, of residence and work in Spain in force, in the established terms In the Spanish legislation on immigration and immigration. b) Be 18 years old at the time of enrolment, in the case of units of competence corresponding to qualifications of level I, and 20 years levels II and III. c) Have work experience and / or training related to the professional competences that they wish to accredit: <ol style="list-style-type: none"> c.1) In the case of work experience: justify, at least 3 years, with a minimum of 2,000 hours worked in total, in the last 10 years before the call was made. For Level I proficiency units, 2 years of work experience will be required with a minimum of 1,200 hours worked in total. c.2) In the case of training: justify, at least 300 hours, in the last 10 years before the call was made. For Level I proficiency units, at least 200 hours are required. In cases where the training modules associated with the unit of 	

	Spanish Organic Law 5/2002	Professional competences standard
	competence to be accredited contemplate a shorter duration, the hours established in those modules must be accredited.	
Opportunities for professional development, validation of competences	Professionals qualifying for "Set-up and Maintenance of Solar Photovoltaic Systems" obtain a Spanish level 2 VET Medium Degree, which gives access to a Spanish level 3 VET Higher Degree. Through any of the two qualification ways described above, professionals can access a level 3 qualification. The directly related professional competence is "Organisations and Projects of Solar Photovoltaic Systems".	
Theoretical knowledge		<p>1. General electrical engineering related to solar photovoltaic installations Nature of electricity. Properties and applications. Electric current. Electrical magnitudes. Magnetism and electromagnetism. Electrical circuits. Structure and components. Symbology and graphic representation. Circuit analysis. Protection systems. Batteries and accumulators. Classification, typology and characteristics. Main electronic components. Typology and functional characteristics. Photovoltaic effect. Systems Three-phase electric. Static and rotary electric machines. Typology and characteristics. Generators, transformers and motors. Load regulators. Invertors. Measures of electrical magnitudes. Procedures. Measuring instruments. Errors in measure. Electrical safety.</p> <p>2. General operation of solar photovoltaic systems Global operation and configuration of a photovoltaic solar installation connected to grid. Global operation and configuration of an isolated photovoltaic solar installation. Storage and accumulation. Global operation and configuration of a support installation with small wind turbine generator. Systems of protection and safety in the operation of the installations. Specifications and description of equipment and constituent elements: panels, supports, followers Solar and anchors, inverters, accumulators, small wind turbines, generators Regulating and control equipment, measuring and protection equipment. Applicable regulations.</p> <p>3. Symbolic representation of solar photovoltaic installations Sketched system. Perspective. Electrical symbol. Representation of electrical circuits. Single-stranded and multi-stranded scheme. Functional symbolic diagrams and diagrams.</p> <p>4. Projects and Technical Memories of Photovoltaic Solar Installations Concept and types of projects and technical memories. Memory, plans, budget, specifications And safety and health study. Plans of situation. Detail and set plans. Diagrams, flowcharts and schedules. Procedures and operations of stakeout of the facilities. Computer equipment in representation and assisted design. Assisted Design Programs. Display and Interpretation of digitized plans. Basic operations with graphic files.</p> <p>1. Installation of solar photovoltaic panels Classification of electrical power supply facilities. Measurement of electrical magnitudes. Routes and general protection panels. Protections. Types and characteristics. Pipelines and pipelines. Drivers. Electrical and electronic equipment for protection, maneuvering and safety. Motorization and automatic solar tracking system. Types of panels. Specifications. Grouping and connection systems. Orientation and inclination. Shades. Solar tracking.</p> <p>2. Structures of subjection of photovoltaic solar installations Civil works: displacement and hoisting of equipment and materials. Types of efforts. Elementary calculus of Efforts. Resistant structures. Types. Materials. Supports and anchors. Resistance of the constructive elements. Waterproofing. Architectural and urban integration. Aesthetics and technique. Structures of monitoring systems. Structures of accumulation systems. Structures of Wind systems. Conventional generator sets.</p> <p>3. Assembly of circuits and electrical equipment of solar photovoltaic installations Determination and selection of equipment and elements necessary for the assembly</p>

	Spanish Organic Law 5/2002	Professional competences standard
		<p>from the planes of the installation.</p> <p>Organization of the assembly of circuits and electrical and electronic equipment of solar installations</p> <p>Photovoltaic. Techniques and procedures.</p> <p>Assembly of circuits and electrical equipment of solar photovoltaic installations.</p> <p>Assembly of circuits and electrical and electronic equipment of wind and generator support systems. Assembly of circuits and equipment</p> <p>Electrical and electronic accumulation systems.</p> <p>Interconnection of the different subsystems of solar photovoltaic installations. Tools and means used in the assembly. Techniques of utilization.</p> <p>4. Quality in the assembly of solar photovoltaic installations</p> <p>Quality in the assembly.</p> <p>Technical prescriptions and quality control sheets.</p> <p>Quality control of materials used in assembly.</p> <p>Quality in assembly operations.</p> <p>Basic economic and strategic aspects of quality.</p> <p>Processes of technical documentation of the quality. Procedures manual.</p> <p>5. Safety in the installation of solar photovoltaic installations</p> <p>Security plans in the assembly of solar photovoltaic installations.</p> <p>Prevention of professional risks in solar photovoltaic installations. Risks arising from monitoring systems. Risks derived from accumulation systems. Risks arising from wind support systems.</p> <p>Work areas. Security signage. Emergencies. Evacuation. First aid.</p> <p>1. Maintenance of solar photovoltaic installations</p> <p>General operation of a solar photovoltaic installation.</p> <p>Procedures and operations for taking measures.</p> <p>Checking and adjusting parameters to setpoints.</p> <p>Maintenance programs for solar photovoltaic installations. Manuals. Projects.</p> <p>Inspection and verification of mechanical installations. Inspection and verification of electrical installations. Critical faults. Regulation of application in the maintenance of photovoltaic solar installations.</p> <p>2. Mantenimiento preventivo de instalaciones solares fotovoltaicas</p> <p>Programa de mantenimiento preventivo. Programa de gestión energética.</p> <p>Seguimiento de energía generada. Evaluación de rendimientos.</p> <p>Operaciones mecánicas en el mantenimiento de instalaciones. Operaciones eléctricas de mantenimiento de circuitos. Equipos y herramientas usuales.</p> <p>Procedimientos de limpieza, engrase, relleno de fluidos electrolíticos, para elementos de las instalaciones auxiliares.</p> <p>3. Corrective maintenance of solar photovoltaic installations</p> <p>Troubleshooting.</p> <p>Procedures for electrically isolating the different components.</p> <p>Methods for the repair of the different components of the installations.</p> <p>Disassembly and repair or replacement of electrical and mechanical elements.</p> <p>4. Quality in the maintenance of solar photovoltaic installations</p> <p>Quality in maintenance.</p> <p>Technical prescriptions and quality control sheets.</p> <p>Quality tools applied to the improvement of maintenance operations.</p> <p>Technical documentation of quality.</p> <p>Reports and control parts. Maintenance manual.</p> <p>5. Safety in maintenance</p> <p>Security plans in the maintenance of solar photovoltaic installations.</p> <p>Prevention of professional risks in the field of maintenance of solar photovoltaic installations.</p> <p>Means and safety equipment. Personal protective equipment. Use and maintenance.</p> <p>Prevention and environmental protection.</p> <p>Emergencies. Evacuation. First aid. Work areas.</p> <p>Security signage. Application regulations.</p>
skills		<p>a) Analyze the most relevant functions, laws and rules of electricity, describing the functionality of the elements and electrical assemblies present in solar photovoltaic installations.</p> <p>b) Analyze the operation of photovoltaic solar installations connected to grid to determine their characteristics and elements related to its and assembly</p> <p>c) Analyze the operation of isolated photovoltaic solar installations and their support systems to determine their characteristics and elements related to its rethinking and assembly.</p> <p>d) To interpret projects and technical memories of solar photovoltaic installations connected to network to carry out rethinking operations and others related to its assembly.</p> <p>e) Interpret projects and technical memories of isolated photovoltaic solar installations with support systems to carry out rethinking operations and others related to their assembly.</p> <p>a) Elaborate work plans for the mechanical and electrical assembly of solar photovoltaic installations according to the projects or technical memories and the established working procedures.</p> <p>b) Analyze the prevention and safety measures regarding the mechanical and electrical assembly of solar photovoltaic installations contained in the safety plans of the companies in the sector.</p> <p>c) To carry out operations of assembly of structures of solar installations from the</p>

	Spanish Organic Law 5/2002	Professional competences standard
		<p>technical documentation, using the tools, equipment and suitable materials and acting under safety standards.</p> <p>d) Perform mechanical and electrical assembly operations and commissioning of photovoltaic solar installations from the technical documentation, using the tools, equipment and suitable materials and acting under safety standards.</p> <p>a) Analyze the general operation of photovoltaic solar installations to develop the maintenance plan.</p> <p>b) Analyze the prevention, safety and environmental protection measures regarding the maintenance of solar photovoltaic installations contained in the safety plans of the companies in the sector.</p> <p>c) Perform preventive maintenance operations of photovoltaic solar installations following the procedures and specifications of the maintenance plan of the installation.</p> <p>d) Perform corrective maintenance of photovoltaic solar installations according to established procedures to return them to their operating state within the established parameters.</p>

The table prepares the summary list of competence requirements for a **vocational trainer in Spain**.

Table 3.21. The summary list of competence requirements for a vocational trainer in Spain

	Spanish Organic Law 5/2002	Professional competences standard
Synthesis		To program, to impart, to tutor and to evaluate formative actions of the subsystem of professional formation for the employment, elaborating and using materials, means and didactic resources, orienting on the formative itineraries and professional exits offered by the labour market in its specialty, promoting in a permanent form the quality of training and didactic updating.
Professional tasks		<p>UC1442_3: Programming training actions for employment, adapting them to the characteristics and conditions of the training, the profile of the recipients and the work reality.</p> <p>UC1443_3: Select, elaborate, adapt and use materials, means and didactic resources for the development of training contents.</p> <p>UC1446_3: Provide information and job guidance and promote the quality of vocational training for employment.</p> <p>UC1445_3: Evaluate the teaching-learning process in the training actions for employment.</p> <p>UC1444_3: Provide and tutor training actions for employment using techniques, strategies and didactic resources.</p>
The job description and the manner of its execution, the areas of the profession occurrence		This professional is located in all productive sectors, in the areas of vocational training for employment, either in the training offered by the competent departments, in demand or in alternation with employment, and other accompanying actions and support for training, or Within non-formal teachings.
Work environment (working conditions, machinery and tools, risks, work organization)		The professional develops his/her professional activity in the public and private, in centres or entities that impart vocational training for the use, for workers in active, in situation of unemployment, as well as to special groups. Their professional performance is carried out in companies, organizations and entities of a public or private nature, that impart training for their own account or for others. In the development of professional activity, the principles of universal accessibility are applied in accordance with current legislation.
Psychophysical and health requirements, including contraindications to professional practice	-	-
Education and powers necessary to work in the profession	<p>The professional should accredit the qualification "Teaching of Training for Employment". There are two ways of obtaining the professional qualification:</p> <ol style="list-style-type: none"> 1. Through obtaining a VET Diploma 2. Through professional evaluation and accreditation <p>Trainers are exempt from possessing Professional Certificate of Teaching of Training for Employment if they obtained:</p> <ol style="list-style-type: none"> 1) Official university degree of: Degree in Pedagogy, Psychopedagogy or Master in any of its specialties, or a university degree of graduate in the field of Psychology or Pedagogy or an official 	

	Spanish Organic Law 5/2002	Professional competences standard
	<p>postgraduate university degree in those area.</p> <p>2) Official university degree different from those indicated in the previous section and that is also in possession of the certificate of Pedagogical Aptitude or of the professional titles of Didactic Specialization and the Certificate of Pedagogical Qualification or a Master's University qualifying for the exercise of the Regulated professions of Compulsory Secondary Education and Bacalaureate, Vocational Training and the Official Schools of Languages.</p> <p>3) Teaching experience: at least 600 hours in the last 10 years in vocational training for employment or in the education system.</p>	
<p>Opportunities for professional development, validation of competences</p>	<p>Professionals qualifying for "Teaching of Training for Employment" obtain a Spanish level 3 VET Higher Degree, which gives access to a Spanish level 4 (EQF = 6) Higher Education at University.</p> <p>The directly related professional university degrees are "Pedagogy" and "Psychopedagogy". The University Access Marks are linked to the marks obtained in the VET Higher Degree. They can also pass the open access test suitable to their age (<25 or >25) to increase their marks</p>	
<p>Theoretical knowledge</p>		<p>1. Structure of vocational training for employment Subsystem of Vocational Training for Employment: characteristics and recipients. Supply training. Demand training and alternation for employment. Certificates of professionalism, training modules and training units: characteristics, structure. Training programs. Professional itinerary. National Qualifications System: professional qualifications.</p> <p>2. The didactic programming of training for employment Elements of didactic programming: objectives, didactic units, contents, methodology, timing, evaluation, materials and resources. The objectives: definition, functions, classification, formulation and drafting rules. The formative contents: typology. Criteria to differentiate the contents. Writing rules. Techniques for the sequencing of contents. Learning activities: typology, structure and writing criteria. Methodology for training: didactic methods and techniques. Means and didactic resources. Evaluation: typology, criteria and instruments.</p> <p>3. Timed planning in training for employment Didactic script, structure and contents. Systematization of information. Sequencing.</p> <p>1. Materials, means and didactic resources in the training actions for employment. Differences between media and didactic resources. Printed material: characteristics and types. Didactic guide. Slate and flipchart: characteristics, types. The overhead projector: features, types. Transparency The video: features and types. The multimedia projector: features and types. Computer applications: multimedia presentation, virtual simulator, among others. Internet: tools and utilities.</p> <p>2. Elaboration and adaptation of materials, means and didactic resources in training for employment Rules on intellectual property. Standards of elaboration. Design and adaptation of materials, means and didactic resources. Preparation of didactic script for different supports.</p> <p>3. Didactic use of materials, resources and resources in training for employment Standards of use in the classroom: printed material, blackboard, flipchart, overhead projector, video, projector Multimedia, computer applications and the Internet. The multimedia presentation: elements, functions and environmental conditions.</p>

	Spanish Organic Law 5/2002	Professional competences standard
		<p>Keys to make an effective presentation: structure and didactic use.</p> <p>1. Professional orientation in training actions for employment Professional and work profile: professional working environment. Functional and technological environment. Professional experience. Professional skills and abilities. Personal, aptitudinal and attitudinal characteristics. Knowledge and interests. The techniques of job search and self-employment: tools. Professional itinerary of employment and training: personal, professional and psychosocial indicators. Professional outings. Statistical information on the labor market. Fields of employment of the specialty. Databases for obtaining addresses of companies in the sector. Documentation and specialized magazines.</p> <p>2. Quality in training for employment: definition and areas Tools and techniques for quality improvement. Follow-up plan: concept, characteristics and purpose. Agents involved. Coordination actions. Strategies for improvement. Schedule. Evaluation procedures. The labor market: impact of the new technologies of the specialty. Analysis of relevant data. Professional exchange: meetings, seminars, congresses, associations and professional networks. Professional innovation: innovation and change strategies. Sources of information for technical and pedagogical updating.</p> <p>1. Assessment of learning in training for employment Evaluation: concept, modalities. Standard and criterion. Types of evaluation. Technical characteristics of the evaluation: reliability, validity. Evaluation tools and techniques according to results and types of learning: Knowledge tests: evaluation of simple learning. Table of specifications. Types of items and rules of elaboration and correction. Instructions for the application of the tests. Evaluation of complex learning: interpretative exercise, test tests. Rules for the elaboration and correction of complex learning tests. Practice tests: check lists, rating scales, practice evaluation sheets: Criteria for preparation and correction, instructions for the application of tests.</p> <p>2. Evaluation of the training process for employment Evaluation criteria and indicators. Qualitative and quantitative techniques for collecting information. Observation and registration sheet: rules of elaboration and use. Rules for the preparation of questionnaires. Tracking sheets. Reports of monitoring and evaluation of training actions and training units. Follow-up plan: elements, characteristics, improvement and reinforcement strategies. Quality control and evaluation: effectiveness, effectiveness and efficiency.</p> <p>1. Psychopedagogical aspects of apprenticeship in vocational training for employment The teaching-learning process in the formation of adults: concept, elements. The teacher and the student: functions, characteristics. Learning: concept, characteristics, types. Learning triggers: attention, memory. Motivation: process, actions and techniques. The theory of communication and the learning process. The process of communication. Interferences and barriers in communication. Training as a communicative process. Verbal and non-verbal communication in the formative process. The dynamics of learning in the group: characteristics, types, phases of group development. The address of the group. Group techniques.</p> <p>2. Methodological strategies in vocational training for employment Teaching methods: concept. Methodological strategies. Elements influencing the choice of methodological strategy: learning outcomes, learning group, contents, resources, organization. Autonomous learning strategies. Teaching skills. Didactic styles. Teaching functions. The training session: structure, characteristics of the didactic exhibition, use of materials, resources and resources. The teaching simulation: micro-teaching and autoscropy.</p> <p>3. Modalities of vocational training for employment Characteristics and types: face-to-face, distance learning, teletraining and mixed. Communication on line. The role of the tutor and his / her roles: active, proactive and reactive. Functions. Organization and planning of actions. Coordination of groups. Search for solutions. Supervision and monitoring of learning. Tutorial skills. Criteria for the timing of the tutorial action. Individualized action plan.</p>
skills		<p>C1: Analyze the regulations on Vocational Training for employment identifying their characteristics and target groups. C2: Apply techniques of teamwork in relation to technical and professional training for the development of training actions. C3: To elaborate the didactic program of a formative action differentiating its constituent elements. C4: Program timed educational units sequencing contents and activities.</p> <p>C1: Apply criteria of selection of materials, means and didactic resources in function of the formative actions. C2: Elaborate didactic materials that favor the acquisition of learning.</p>

	Spanish Organic Law 5/2002	Professional competences standard
		<p>C3: Use materials, means and didactic resources according to technical specifications, safety and environmental health standards, according to a training context.</p> <p>C1: Define information channels for the identification of professional contexts that facilitate decision making in processes of insertion or professional promotion.</p> <p>C2: To encourage the active participation of each student in his process of information and professional orientation.</p> <p>C3: To elaborate procedures of transmission and advice on the professional and productive environment that make possible the updating of the information.</p> <p>C4: Plan professional updating procedures and innovation strategies, specifying pathways and exchange learning activities with other professionals.</p> <p>C5: Select methodological strategies that contribute to improving the quality of the learning process.</p> <p>C1: Analyze the purpose and types of evaluation that facilitate the adequacy of the training level to the profile of the students.</p> <p>C2: Elaborate tests and evaluation instruments with objective criteria, providing the guidelines for their use in a training action.</p> <p>C3: Elaborate criteria and select evaluation indicators that determine the level of learning achieved by the students of the training action and provide information on the training process.</p> <p>C1: To establish strategies that facilitate the learning of adults, prior to the formative action.</p> <p>C2: Generate channels for the active participation of students in the development of training actions.</p> <p>C3: Select communication techniques that are applicable in the training action.</p> <p>C4: Analyze methodological strategies that favour the acquisition of professional skills.</p> <p>C5: Determine tools to monitor the student learning process by providing personalized help strategies when needed.</p>

Summary

Spain complies with the European Directive 2009/28/EC binding member states to set-up certification schemes for installers of solar photovoltaic systems. The “Set-up and Maintenance Solar Photovoltaic Installer” professional certification responds to this need and respects the general recommendations of this directive, after its last update in 2015.

The definition, monitoring and accreditation of qualifications are carried out by the INCUAL (Spanish National Institute of Qualifications), a public agency dependent on the State Ministry of Education, Culture and Sports. INCUAL has coordinated the development of the National System of Qualifications and Vocational Training (National Qualifications Framework or NQF). This system defines the different ways of access to professional qualifications. First, through the achievement of a VET diploma after a period of formal VET, and second through the evaluation and accreditation of professional competences acquired through work experience or non-formal training pathways. In this second case, you regularly need to accredit a minimum of 3 years-experience in developing the competencies, and using the skills and knowledge present in the qualification standard.

The National Catalogue of Professional Qualifications is also developed by INCUAL, and it comprises the most significant professional qualifications of the Spanish production system. The Catalogue is organized into professional families and levels. Thus, 26 professional families have been defined – according to criteria of affinity of the professional competence of the occupations and detected jobs – and 5 levels of qualification, according to the degree of knowledge, initiative, autonomy and precise responsibility to carry out this professional activity.

There are 5 levels in the Spanish Qualification Framework (2004), differing from the 8 European Qualification Framework levels (2008). In order to guarantee inter-level coherence, a National Coordination Point was created in the Ministry.

Eventhough there is no specific professional qualification for the “Set-up and Maintenance Solar Photovoltaic Installer Trainer”, becoming a trainer for this module requires two combined professional qualifications:

- "Set-up and Maintenance Solar Photovoltaic Installer" (Spanish level 2 –EQF = 3/4),
- "Teaching in Training for Employment" (Spanish level 3 – EQF = 5) (or any of its substituting higher level degrees: Degree in Pedagogy, Psychopedagogy, certificate of Pedagogical Aptitude or of the professional titles of Didactic Specialization and the Certificate of Pedagogical Qualification).

The professional qualification structure is aligned with ECVET recommendations on the definition of contents. The professional competence of a person is structured along competence units, composed by a set of knowledge and skills that enable the person to carry out the professional activity according to the demands of production and employment.

The report shows an in-depth description of those competences, knowledge and skills that are required to become a set-up and maintenance solar photovoltaic installer trainer in Spain, by combining the contents of the two –minimum– combined professional qualifications.

3.4. Cyprus

Experience of the Cyprus partner (EDITC) is that there is no occupational profile for the Photovoltaic installers or Photovoltaic Trainers. Although there are regulations that regulate the organizations who may offer authorised training to the installers as well as the examining organizations who can test the competence of the installers, there is no occupational profile neither for the installers nor for the trainers on photovoltaic systems. Although the profession of the photovoltaic installer is regulated, there is no occupation profile for the installer and trainer.

Therefore this study aims to extract the useful information for the competences required for the regulated profession of the photovoltaic installer and from thereof to be able to analyse the occupational requirements (skills and competencies) for the photovoltaic trainer in the partner countries.

We have focused on analysing documents (regulations) that exist for a) the photovoltaic installers, b)for the training providers and c)examination organizations in the form of qualitative analysis in order to provide the partnership with an overview of the current situation in Cyprus.

The analysis assumed initially that the profile of competency requirements for a PV trainer will consist of two competencies (Fig. 3.6):

- 1) Proven Specialist Knowledge, Skills and Competences in PV Installations.
- 2) Training Capacity.



Fig. 3.6. Structure of the qualifications required of a PV trainer

Since there is no description of professional qualifications for the PV Trainer, the aim of the study focuses to collect and analyze the regulated requirements for the photovoltaic installer. It aims to:

1. Collect and analyse descriptions of professional competence and standards for the Photovoltaic installer
2. Legal requirements for the photovoltaic installer
3. Training and exam provision for the Photovoltaic installer (e.g. educational standards, curricula, available training materials, assessment and validation methods of professional competences)

In reference to the training capacity of the photovoltaic trainer, the responsible body for the National Qualification Standards (Human Resource Development Authority – HRDA) has developed a generic Occupational Profile for the trainer (disregard of the topic he/she teaches). This profile defines the knowledge, skills and competences of the trainer. All trainer in Cyprus who wish to train and get funding from the HRDA must be accredited by the HRDA based on the trainer's occupation profile.

In Cyprus, the analysis was based on the following documents:

- 1) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77 / EC and 2003/30 / EC (Dz. U. L 140/16 of 5.6.2009) In particular: Appendix IV: Certification of installers.
- 2) The Promotion and Encouragement law for the use of renewable Energy Sources law of 2013 (N112(1)/2013)
- 3) The Promotion and Encouragement modified law for the use of renewable Energy Sources law of 2015(N121(1)/2015)
- 4) Modification of the laws “The Promotion and Encouragement modified law for the use of renewable Energy Sources law of 2013 and 2015” (N157(1)/2015)
- 5) The Promotion and Encouragement law for the use of renewable Energy Sources law of 2013 – The decree based on article 43(d) KDP 26/2017
- 6) The Promotion and Encouragement law for the use of renewable Energy Sources law of 2013 – The decree based on article 43(c) and 43 (e). KDP 25/2017

3.4.1. Identification of competence requirements (specialist knowledge) for photovoltaic installers

1) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources¹⁵

The Directive applies for all EU Member States, that is in all partner countries participating in the EU-PV Trainer project.

Article 14. Information and training states that:

- **Member States shall ensure that certification schemes or equivalent qualification schemes** become or are available by 31 December 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate, and shall be based on the criteria laid down in Annex IV. Each Member State shall recognise certification awarded by other Member States in accordance with those criteria.
- Member States shall make available to the public information on certification schemes or equivalent qualification schemes as referred to in paragraph 3. Member States may also make available the list of installers who are qualified or certified in accordance with the provisions referred to in paragraph 3.

¹⁵ <http://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=CELEX:32009L0028&from=PL>, 20.09.2016.

Annex IV sets out the general recommendations for the certification of installers and states that certification schemes or equivalent qualification schemes referred to in Article 14 paragraph 3, are based on the following criteria:

1. The certification or qualification process shall be transparent and clearly defined by the Member State or the administrative body they appoint.
2. Biomass, heat pump, shallow geothermal and solar photovoltaic and solar thermal installers shall be certified by an accredited training programme or training provider.
3. The accreditation of the training programme or provider shall be effected by Member States or administrative bodies they appoint. The accrediting body shall ensure that the training programme offered by the training provider has continuity and regional or national coverage. The training provider shall have adequate technical facilities to provide practical training, including some laboratory equipment or corresponding facilities to provide practical training. The training provider shall also offer in addition to the basic training, shorter refresher courses on topical issues, including on new technologies, to enable life-long learning in installations. The training provider may be the manufacturer of the equipment or system, institutes or associations.
4. The training leading to installer certification or qualification shall include both theoretical and practical parts. At the end of the training, the installer must have the skills required to install the relevant equipment and systems to meet the performance and reliability needs of the customer, incorporate quality craftsmanship, and comply with all applicable codes and standards, including energy and eco-labelling.
5. The training course shall end with an examination leading to a certificate or qualification. The examination shall include a practical assessment of successfully installing biomass boilers or stoves, heat pumps, shallow geothermal installations, solar photovoltaic or solar thermal installations.
6. The certification schemes or equivalent qualification schemes referred to in Article 14(3) shall take due account of the following guidelines:
 - a) Accredited training programmes should be offered to installers with work experience, who have undergone, or are undergoing, the following types of training:
 - (iii) in the case of a solar photovoltaic or solar thermal installer: training as a plumber or electrician and *have plumbing, electrical and roofing skills, including knowledge of soldering pipe joints, gluing pipe joints, sealing fittings, testing for plumbing leaks, ability to connect wiring, familiar with basic roof materials, flashing and sealing methods as a prerequisite*; or
 - (iv) a vocational training scheme to provide an installer with adequate skills corresponding to a three years education in the skills referred to in point (a), (b) or (c) including both classroom and workplace learning.
 - d) **The theoretical part of the solar photovoltaic and solar thermal installer training** should give an overview of the *market situation of solar products and cost and profitability comparisons, and cover ecological aspects, components, characteristics and dimensioning of solar systems, selection of accurate systems and dimensioning of components, determination of the heat demand, fire protection, related subsidies, as well as the design, installation, and maintenance of solar photovoltaic and solar thermal installations*. The training should also provide *good knowledge of any European standards for technology, and certifications such as Solar Keymark and related national and Community law*. The installer should demonstrate the following **key competences**:
 - (i) *the ability to work safely using the required tools and equipment and implementing safety codes and standards and identify plumbing, electrical and other hazards associated with solar installations*;
 - (ii) *the ability to identify systems and their components specific to active and passive systems, including the mechanical design, and determine the components' location and system layout and configuration*;
 - (iii) *the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar water heater, taking account of shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate and identify different installation methods suitable for roof types and the balance of system equipment required for the installation*; and

(iv) for solar photovoltaic systems in particular, the ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate interconnection point.

e) The installer certification should be time restricted, so that a refresher seminar or event would be necessary for continued certification.

2) Regulation 25/2017 – 43(d)

This article sets the basic rules for the training providers and examining organization of photovoltaic systems. Specifically:

- a) the subjects for the tests to be taken by installers of small scale photovoltaic systems.
- b) The cost of the exam describing in detail how the costing was calculated
- c) The success criteria and the selection of questions for the exam.

The main points of this article are analysed below:

Paragraph 3: Training providers

- (1) The training provider is the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism.
- (2) The Director of the Energy Service may approve and authorize another public service other than the Energy Service or a private organisation, a higher scientific or other institute or a technical training organisation or association with proven experience in organizing technical training programs as a training provider for organizing training programs for installers of small-scale boilers and biomass boilers, and / or solar photovoltaic systems

Provided that, when this paragraph is applied, the Energy Service does not act as a training provider.

Paragraph 4: Criteria which the training provider must fulfill

The training provider must:

- (A) ensure continuity and regional or national coverage of the training program;
- (B) have the necessary infrastructure, including appropriate technical training facilities for practical exercise, and in particular laboratory equipment or similar facilities, so that the practical training of prospective installers is similar to the actual data of the corresponding work;
- (C) be able to offer the basic training, which includes a theoretical and practical part, as defined in the Regulations issued under Article 44 (e) of the Law;
- (D) to ensure that its staff are fully aware of the Greek language, have excellent knowledge of the relevant basic training as defined in the Regulations issued under Article 44 (e) and have extensive experience in organizing technical training programs and to this end Submit a curriculum vitae for each member of its staff who will organize a training program;
- (E) to provide shorter training courses on up-to-date topics, including new technologies, legislation and standards, allowing lifelong learning for installers and their right to renew their registration in accordance with the Regulations issued under Article 43 (b) of the Law;
- (F) to ensure that the qualified installer is able to comply with all applicable codes and standards, including those relating to energy and eco-labeling, as well as the safety and health rules associated with the work concerned.

Paragraph 5: Examining organisation

- (1) Subject to the provisions of paragraph (2), the examining organisation shall be the Energy Service of the Ministry of Energy, Commerce, Industry and Tourism.
- (2) The Director of the Energy Service may approve and authorize another public service except Energy Service or private organization, upper scientific or other institution, as examining organization capable of organizing tests on theoretical and practical issues, the success of which is a proof that the person has the skills to carry out installations of small-scale boilers and stoves biomass facilities, or / and solar photovoltaic and solar thermal systems.

Paragraph 6: Criteria to be fulfilled by the Examining organization

6(1) The examining organisation

- (A) organizes and conducts examinations taking into account the examinable material specified in a Decree issued under Article 43 (d) of the Law;
- (B) ensures the integrity of the examinations and evaluates prospective installers in an objective and impartial manner;
- (C) submits to the competent authority, for approval, a detailed statement of calculation of the fee that it intends to charge the exam's participants;
- (D) ensures through its organizational structure, including its staff and customers, its independence from prospective installers;
- (E) establishes regulations and procedures that separate the organization of examinations and the evaluation of candidates from the other activities of the organization;
- (F) ensures that the activities of the cooperating organizations do not affect the confidentiality and impartiality of the assessment of prospective installers;
- (G) has a reliable system for exporting, notifying and filing the results of examinations of prospective installers, as well as a system for investigating objections or complaints by candidates;
- (H) ensures that the surveillance of prospective installers during the examinations takes place in such a way as to prevent communication between them;
- (I) ensures that the exam paper setter and examiners are well acquainted with the Greek language, have excellent knowledge of the relevant terminology of the subject, have extensive experience in setting up exam papers and evaluating candidates and have no interest in any candidate or group of candidates, so that the evaluation is impartial and objective. For this purpose the examining organization presents to the competent authority a CV for each exam paper setter / examiner;
- (J) has the necessary infrastructure and equipment so that the practical examination of the prospective installers is similar to the actual data of the respective work.

Paragraph 7: Evaluation process of the training provider and the examination organisation.

- 7(1) An organization wishing to organize training programs and / or exams for installers of small scale boilers and biomass heaters and / or solar photovoltaic and solar thermal systems shall submit a request to the competent authority, in a form specified in a notice posted on the authority's website.
- (2) The application shall be accompanied by all necessary information and a document certifying that the organization concerned meets the criteria of paragraphs (4) and (6) as appropriate.
- (3) The competent authority shall examine the supporting documents submitted in order to ascertain whether the criteria set out in paragraphs (4) and (6) are being met by the organization concerned and decide whether to approve or reject the application.
- (4) If, upon examination of the application and within twenty (20) working days from the date of receipt of the application, the competent authority finds that the organization concerned has not submitted a fully completed application or requires additional clarifications and / or supporting documents, then it may request them in writing from the organisation concerned, also by setting the time limit within which they must submit them.
- (5) The competent authority shall post on its website a notice announcing the approved training providers and examining organizations.
- (6) In case a training provider or examining organization contracts with a partnering organization, then this it shall inform the competent authority thereof within thirty (30) days of the conclusion of the contract.

Paragraph 8: Informing the competent authority about changes to the criteria.

- 8. The training provider and / or the examining organization shall inform the competent authority of any changes concerning the supporting documents submitted in the application under paragraph 7 (2).

Paragraph 9: Supervision of a procedure.

9.– (1) The competent authority may, unilaterally and without the prior approval of the training provider and / or the examining organization, monitor and intervene in the whole training procedure and / or examination procedure so as to ensure proper Implementation of the whole process.

(2) The competent authority may, in the course of the final selection of examination topics or during examinations and in the process of correcting and scoring the written tests, attend to ensure the integrity of the examinations without requiring prior approval of the examining organization.

Paragraph 10: Suspension of approval and authorization of a training provider and / or examining organization.

10. The competent authority may, by a reasoned decision, suspend the approval and authorization of a training provider and / or examining organization which does not continue to meet the criteria in paragraphs 4 and 6.

Paragraph 11: Fee

11. Interested training providers and/or examining organization will pay a fee of EUR 625, plus VAT, to the competent authority for the purpose of examining their application.

Paragraph 12: Period for which approval and authorization holds

12. Subject to the provisions of paragraph 3 (2), training providers and examining organizations may organize training and examinations, respectively, for three (3) consecutive years and their authorization may be renewed automatically subject to compliance with the Criteria set out in paragraphs 4 and / or 6.

Paragraph 13: Training program duration

The minimum duration of the training program is 40 hours and for shorter cycles is 10 hours

Paragraph 14: Removal of CPA 442/2013

14. The Promotion and Encouragement of the Use of Renewable Energy Sources (Criteria to be met by the training providers and examining organizations of small scale boilers installers and of biomass heaters, and / or solar photovoltaic and solar thermal systems) Decree of 2013 is abolished from the date of publication of this Decree in the Official Gazette of the Republic of Cyprus.

Conclusion:

This article sets the process for the accreditation of training providers and examination organizations. It should be noted that there is no clear definition of the training the PV trainers should undertake in order to be able to deliver training to the installers. It should also be noted that during the application procedure the CVs of the trainers are submitted to the Energy Department and their approval will be based on their academic qualifications and experience / projects undertaken.

3) Regulation 26/2017 – 43(d)

This article sets the minimum examination subjects as well as the exam success criteria.

Below we highlight the main points of this article:

Paragraph 3: Exam syllabus-Annex 1

The exam syllabus on which examinations are based that is carried out by the examining organization is set out in Annex I.

Paragraph 4: Exam fees

The examining organization shall submit for approval to the competent authority the fee it imposes for participation in the examinations organized for installers of small-scale boilers and biomass heaters and / or solar photovoltaic and solar thermal systems, accompanied by a detailed statement justifying the amount of the fee.

Paragraph 5: Exam program. Evaluation. Annex 2

The program, the criteria for success and the selection of the questions and topics of the examination are set out in Annex II.

Annex 1

Examination syllabus on which the examinations are based to be conducted by examining organization for installers of small scale boilers and biomass heaters, and / or solar photovoltaic and solar thermal systems

1. The examination syllabus must cover the main subjects of basic training as defined in the Regulations issued under Article 44e)
2. Without prejudice to paragraph 1, the examination syllabus shall include at least the following:
 - 2.1. Relevant European and national legislation governing the installation of small-scale boilers and biomass boilers heaters, and / or solar photovoltaic and solar thermal systems.
 - 2.2. The technical specifications of the equipment and systems in the category to which the installers will be registered, as defined in the Regulations issued under Article 44 of the Law, as well as the European and international standards, eco-labels and energy labels for such equipment.
 - 2.3. The systems and equipment in the category to which installers will subscribe the individual parts of the system / equipment and how they operate.
 - 2.4. The obligations of the installers for health and safety issues at work, as well as the measures to be taken in accordance with the provisions of the legislation on safety and health at work.
 - 2.5. The relevant grants / subsidies for the systems and equipment to be installed by installers.
 - 2.6. Assessing the size of the components of the system, the devices and the required equipment.
 - 2.7. The correct installation of the system / equipment, its inspection and maintenance.
 - 2.8. The risks associated with the performance of their work, as well as the recognition of faults, errors and / or disregards of the installation.

Annex 2

Program, Success Criteria of success, and Selection of Questions and topics of the Examination

A. Exam Program:

The examination program should include a theoretical and practical part. The practical part should be carried out in appropriate laboratory facilities of the examining organization or partner organization.

1. The theoretical examination is intended to make sure that the candidate installer has sufficient theoretical knowledge regarding the work for which he has been trained and will carry out. This assessment shall be made either by written examinations or by continuous assessments in the form of multiple choice questions in accordance with the examination syllabus set out in Annex 1.
2. The practical examination is intended to verify that the candidate installer has sufficient practical skills to install the related equipment and systems of the category in which he will be enrolled and is therefore carried out in specially designed spaces (workshops) which are offered for this purpose. This assessment will be carried out in the form of specific practical works, in specially constructed laboratory infrastructures and under realistic conditions similar to the actual conditions of the corresponding work and according to the exam syllabus specified in Annex 1.
3. The results for each candidate installer for both the theoretical and practical examination as well as any observations of the examiner shall be recorded in a special assessment form which forms an integral part of the evaluation file of each candidate installer.

B. Criteria of Success:

The candidate installer should successfully complete all the practical tasks assigned to him by the examiner. In case of failure in part of the practical work, the candidate will have to retake the part where he has failed.

The candidate installer is considered to have successfully completed the exam when he / she has at least 50% of the grade in both the theoretical and practical part and his overall score for both parts is at least 70%.

C. Selection of questions and topics of the examination

1. Each examining organization shall submit to the competent authority proposed questions and answers of the theoretical examination and topics for the practical work i. The competent authority will create a database of all the proposed questions, answers and practical work from which the questions and topics will be randomly selected.
2. The number of questions and practical work within the database should be proportional to the weight given to the different modules / topics for example the modules / topics that are considered to be very important for the proper assessment of the candidate installer; must be represented with more questions / practical works than those that are considered less important.
3. Questions, practical works and their answers included in the database shall be evaluated and reviewed annually by the competent authority in consultation with the authorized examining organizations.

Conclusion:

This article describes the subjects to be tested during the exams for the certification of photovoltaic installers. As mentioned in the training provider application, the trainer(s) should be in position to deliver the training in all the subjects mentioned above. Therefore, indirectly we can extract the topics that should be covered in a PV-Trainer course.

4) Regulation 19/2014

This regulation refers to the following main points:

1. Categories of Installers.
2. Registration in the register of installers.
3. Renewing the registration.
4. Content and maintenance of the register.
5. Certificate of Competence for the installer.
6. Duration of Certificate.
7. Suspension or termination of Certificate.
8. Documentation kept for the projects of the installers.
9. Qualifications and Knowledge of the installer.
10. Responsibilities and duties of the installer.
11. Training program for the Basic Training of the installers.

Below we analyze the main paragraphs of this article:

Paragraph 4: Categories of installers:

Installers may register for one or more of the following categories of renewable energy systems as long as they fulfil the criteria referenced in sub-paragraph (a) of paragraph 3 of Regulation 6 and hold the qualifications mentioned in Regulation 15:

Category A: Installers of and biomass.

Category B: Installers of heat pumps.

Category C: Installers of photovoltaic or thermal systems.

Paragraph 5: Registration of Installers

a) A physical person may register as a RES installer in order to implement RES installations and according to the duties and responsibilities of the current regulations

b) During the registration the competent authority must define in which category(ies) the person is registered

c) The competent authority may register the person only if the following conditions are met

1. The person has applied to the competent Authority using the template provided in Annex 1.
2. The form is accompanied with the following documents:
 - Payment Receipt,
 - Proof of registration of himself/herself or his/her employer to the VAT,

- Certificate of successful completion of the exam for the RES installers,
- Certificates that prove that he/she holds the qualifications as set in Regulation 15.

Paragraph 6: Registration Renewal

The registration is automatically renewed provided that:

1. The installer informs in writing his intention to renew his/her registration.
2. The registration prerequisites are still fulfilled based on the current regulations.
3. The competent authority is satisfied that the installer has complied with any directive according to the Regulation 11.
4. The installer has paid the renewal registration fee as set in Annex II.

Paragraph 7: Competence Certificate of the installer

1. The competent authority will provide the installer with a competence certificate which he/she must present if required by the owner of the systems.
2. The competence certificate is automatically cancelled in the case where the installer becomes physically or psychologically incompetent.

Paragraph 8: Certification from other member states

1. The physical persons who have acquired installer certification for the installation of small RES from authorities of other member states must submit a translation of the certificate acquired in the official language of the Cyprus Government.
2. The competent authority will recognize the certificates as mentioned above provided that they fulfill the criteria of paragraph 3 of Regulation 6.

Paragraph 9: Duration of Certificate

1. The certificate of the installer has a duration of 5 years:
 - a. Every 5 years the installer must attend shorter training courses on current subjects including new technologies, laws and standards that will allow him/her to renew his/her registration.
 - b. The training provider must issue a certificate for every training cycle/course he/she attended.

Paragraph 10: Suspension or Termination of the installer registration

The competent authority may suspend or terminate an installer registration if:

- The installer fails to comply with the responsibilities/commitment as set in the current regulations.
- The installer systematically fails to deliver according to his duties and responsibilities based on the competent authority's findings.

Paragraph 11: Documentation kept by the installers for the RES projects

For each project the installer must keep:

1. The address of the installation.
2. Equipment installation designs.
3. Date of project delivery.

Paragraph 12: Qualifications and Knowledge of the installer

The training programs of Regulation 17 are offered to the installers who hold the academic qualifications and experience as presented in Annex III who are currently or have completed the following types of training:

- a) For Category c: Photovoltaic and sun-thermally installers with the following qualifications: plumber or electrician training and knowledge on plumbing, electricity and roofing techniques.
- b) VET program that provides the installers the necessary skills that correspond to 3-years study on the topics mentioned above.

Annex III – Regulation 15

A/A	Academic Qualification of Candidate	Professional Experience relevant to the work
1	None or elementary or gymnasium certificate or certificate from the Adult Education Center of Ministry of Education	5 years
2	Lyceum Certificate (6 grade class)	4 years
3	Technical School Certificate in one or more training types of Regulation 15	3 years
4	Diploma or Bachelors in engineering that is acquired via a minimum 3 year studies	2 years
5	Diploma or Bachelors that is directly related that is acquired via a minimum 3 year studies	1 year

Annex IV (Regulation 17(1))

Category C: Training of installers of photovoltaic and solar thermal systems

The theoretical part of the photovoltaic and solar-thermal installers training must include:

1. A spherical picture of the situation of the solar products market and cost/profit comparison and should cover all the ecological aspects, the characteristics, components and dimensioning of solar systems, the selection of precision systems and dimensioning of their components, the definition of heating requirements, fire protection, subsidies, health and safety issues, as well as design, installation and maintenance of photovoltaic and solar thermal systems. The training should also provide sufficient knowledge of European Standards that refer to technologies and certifications such as “Solar Keymark” as well as national and European legislation.

The installers should gain the following **skills**:

1. Ability to work and use the necessary tools and equipment with safety abiding to the codes and standards for safety and should also be able to identify plumbing, electrical and other risks that are related to the solar installations.
2. Ability to recognize the systems and the components of active and passive systems including the mechanical design and the ability to determine the position of the components, the order and the configuration of the system.
3. Ability to define the proper orientation and angle of the solar panel taking into account shading, solar access, structural integrity, and installation appropriateness for the specific building and climate as well as the ability to identify the appropriate methods for installations on a variety type of roofs and the equipment necessary for the installation.
4. For the photovoltaic installations the ability to adjust the electrical design, ability to define amperage, selection of appropriate conductors and flows for each electric circuit, selection of the right size, capacity and position of each connected equipment and subsystem and selection of the right point of connection.

Conclusion

This article provides an overview of the topics that should be covered in a training of photovoltaic installers and thereof can form the basis for the development of the curriculum for the photovoltaic trainers’ trainers.

3.4.2. National Qualification Standards

In Cyprus, the body responsible for the National Qualification Standards is Human Resource development Authority. For very few occupations the National Qualification Standards have been developed. There are no Qualification Standards neither for the photovoltaic installers nor for the Trainer.

1) Vocational/Professional Trainer Occupational Profile

HRDA has developed the occupational profile for the VET trainers. The profile addresses 4 main work areas:

- Training needs analysis
- Designing programs/training modules
- Delivering training programs/modules
- Evaluating Training Programs/modules

Each work area provides a detailed list of tasks that the trainer should have the capacity to perform.

In order for a trainer to be certified should

1. Have at least 240 training hours or attend an accredited by the HRDA 60 hours Train The Trainer training course
2. Pass the examination process (which is based on the Occupational Profile) which consists of
 - a) 15 minutes training demonstration,
 - b) Written Exam,
 - c) Interview.

We consider that the separation of the Specialist Knowledge on photovoltaic systems from the Trainer's training capacity makes the description of the PV Trainer Profile simpler.

Summary of the competence requirements for a PV Trainer in Cyprus

The Energy Service of the Ministry of Energy, Commerce and Tourism has regulated the profession of the photovoltaic installer (training requirements, examinations, registration in the ministry's registry etc). It has also made provisions for the certification of the training providers and examination organizations delivering training to the installers. Although in the application of the training provider the CV of the trainer is enclosed and the Energy Service can approve or decline the trainer based on his/her academic qualifications and/or experience in photovoltaic installations, there is no formal description of the qualification requirements for a trainer conducting theoretical and practical training in the field of photovoltaics. Even so, the regulations mentioned above imply that the trainer should have the capacity to teach all the topics as outlined in Annex IV above.

4. Analysis report on existing profiles and tasks regarding competence standards of PV trainers in Poland, Romania, Spain and Cyprus

The chapter presents a comprehensive set of competency requirements in project partner countries for PV trainers.

The analyzes carried out confirmed that there is no PV coach in official uneducated documents in Poland, Romania, Spain and Cyprus. It can be created by submitting two professional competencies. The first one is specific for the installer of the PV installation and the other for the trainer (pedagogical).

The range of knowledge and skills presented in the table below is the minimum required to run a PV trainer for PV installations.

The comparative analysis shows that the following common elements (Table 4.1, 4.3) can be distinguished in the descriptions of competence requirements of a PV trainer:

- 1) Synthetic description of profession / competence.
- 2) List of professional tasks.
- 3) List of required knowledge.
- 4) List the necessary skills.

In the case of Spain and Poland there are additional elements common to the description of competence requirements, which describe:

- 1) The job description and the manner of its execution, the areas of the profession occurrence.
- 2) Work environment (working conditions, machinery and tools, risks, work organization).
- 3) Education and powers necessary to work in the profession.
- 4) Opportunities for professional development, validation of competences.

The collected data from the comparative analysis (Table 4.2, 4.4) will be used to draw up a description of the professional qualification standard for the PV trainer, which will consist of two professional competencies: necessary for assembling PV installations and conducting classes with trainers.

Table 4.1. Comprehensive set of competency requirements for PV installation in partner countries

	Directive PEIR NR 2009/28 /WE	Description of the profession – Poland	Professional competences standard – Poland	Description of the profession – Romania	Occupational Standard for a job in Romania	Vocational/Professional Trainer Occupational Profile Cyprus	Spanish Organic Law	Professional competences standard – Spain
Synthesis		X	X					X
Professional tasks		X	X			X		X
The job description and the manner of its execution, the areas of the profession occurrence			X					X
Work environment (working conditions, machinery and tools, risks, work organization)			X					X
Psychophysical and health requirements, including contraindications to professional practice			X					
Education and powers necessary to work in the profession			X				X	
Opportunities for professional development, validation of competences			X				X	
Knowledge	X		X	X	X	X		X
Skills	X		X	X	X	X		X
Competences			X	X	X	X		
Units of competence					X			
elements of competences					X			

Table 4.2. Comparative analysis of competency requirements in PV installation assembly in partner countries

	Description of the profession – Poland	Professional competences standard – Poland	Professional competences standard – Spain
Synthesis	X	X	X
	A renewable energy systems installer performs installations for the production of energy from various renewable sources, such as: solar, wind, biomass, biogas, water, geothermal energy and their maintenance and service during operation. Among the installer’s duties organizational tasks may be enumerated (preparation and securing installation site from hazards and accidents, mounting equipment preparation), installation tasks (which depend on the type of installation and cover the selection of tools, materials and equipment; the installation, ongoing supervision and control of the work, drivers and surveillance equipment programming, commissioning of equipment), operational tasks (controlling the operation of the equipment and energy systems, fault diagnosis, preservation, removal and repair of RES), advisory functions (user training in the use of devices installed, their programming and reading of alarm events).	A renewable energy systems installer performs installations for the production of energy from various renewable sources	Carry out the installation, commissioning, operation and maintenance of solar photovoltaic installations complying with the applicable regulations

	Description of the profession – Poland	Professional competences standard – Poland	Vocational/Professional Trainer Occupational Profile Cyprus	Professional competences standard – Spain
Professional tasks	X	X		X
	A renewable energy systems installer should have basic vocational education within the mechanical or electrical field, completed with courses related to the installation of the RES equipment, i.e. electrical, sanitary, heating, cooling or mechanical devices. An employee not having the experience should work under the supervision of a supervisor. It is advisable to have a driving license of B category, since the work can be carried out in an open area and require mobility. An installer should continuously update his knowledge and improve professional skills, therefore, he should participate in the training courses organized by trade associations or specialized training centres. In the case of individual work, it is desirable to have a certificate of a given specialty installer – issued under the provisions of the relevant regulation to the Act.	Z1. The analysis of the project documentation with regard to adaptation to existing environmental and construction conditions (necessary competence: Kz1, Kz2, KzS). Z2. Preparing the equipment and renewable energy systems installations (necessary competence: Kz1, KzS). Z3. Selection and use of machinery, devices, tools and measurement and control instruments used during the installation (the necessary competence: Kz1, Kz2, KzS). Z4. Installation in stages of devices and renewable energy systems, according to the documentation (essential competencies: Kz1, KzS). Z5. Controlling the installation and operation of a RES system at each stage (necessary competence: Kz1, KzS). Z6. Programming and setting up control devices installed in the system (the necessary competencies: Kz1, KzS). Z7. Commissioning and testing of the complete installation (the necessary competence: Kz1, KzS). Z8. Connecting the installation to remote monitoring (essential competencies: Kz1, Kz2, KzS). Z9. Performing work related to the operation of equipment (inspection, maintenance, adjustment and repair) (required competencies: Kz2, KzS).	2.1 Relevant European and national legislation governing the installation of small-scale boilers and biomass boilers heaters, and / or solar photovoltaic and solar thermal systems. 2.2 The technical specifications of the equipment and systems in the category to which the installers will be registered, as defined in the Regulations issued under Article 44 of the Law, as well as the European and international standards, eco-labels and energy labels for such equipment. 2.3 The systems and equipment in the category to which installers will subscribe the individual parts of the system / equipment and how they operate. 2.4 The obligations of the installers for health and safety issues at work, as well as the measures to be taken in accordance with the provisions of the legislation on safety and health at work. 2.5 The relevant grants / subsidies for the systems and equipment to be installed by installers. 2.6 Assessing the size of the components of the system, the devices and the required equipment. 2.7 The correct installation of the system / equipment, its inspection and maintenance. 2.8 The risks associated with the performance of their work, as well as the recognition of faults, errors and / or disregards of the installation.	UC0835_2: Rethinking solar photovoltaic systems UC0836_2: Set-up solar photovoltaic installations UC0837_2: Maintaining solar photovoltaic installations

		Z10. Handing the system for use with the manual (the necessary competence: Kz1, KzS). Z11. Organizing the workplace in accordance with health and safety, fire and environment protection, the ergonomic requirements (the necessary competence Kz1, Kz2, KzS).		
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	Professional competences standard – Poland	Professional competences standard – Spain
	X	X
The job description and the manner of its execution, the areas of the profession occurrence	A renewable energy systems installer performs installations for the production of energy from various renewable sources, such as: solar, wind, biomass, biogas, water, geothermal energy and their maintenance and service during operation. Among the installer’s duties organizational tasks may be enumerated (preparation and securing installation site from hazards and accidents, mounting equipment preparation), installation tasks (which depend on the type of installation and cover the selection of tools, materials and equipment; the installation, ongoing supervision and control of the work, drivers and surveillance equipment programming, commissioning of equipment), operational tasks (controlling the operation of the equipment and energy systems, fault diagnosis, preservation, removal and repair of RES), advisory functions (user training in the use of devices installed, their programming and reading of alarm events).	This professional is located in the energy sector, subsector of renewable energies, in the productive activities in which the assembly, operation and maintenance of photovoltaic installations for the production of electric energy is carried out

	Professional competences standard – Poland	Professional competences standard – Spain
	X	X
Work environment (working conditions, machinery and tools, risks, work organization)	The workplace of a renewable energy systems installer is varied and depends on the location of the service. Mostly, these are residential buildings, warehouses, industrial land in open spaces and other facilities located in both urban and rural areas. Performing the tasks is associated with strict observance of safety rules for the work environment. The installation can be done both on the ground and on the top of the building and in the production– assembly hall. The job of a renewable energy systems installer can be performed at a height (roofs), which is associated with the need to have the appropriate permissions. In the course of their work, there may be health risks caused by arduous work, for example: underexposure, excessive sunlight and high temperature on the roofs. The installation process usually requires one shift working system. The installer performs tasks in the team – his work is supervised and often requires security from other team members.	The professional develops his or her professional activity in the area of production dedicated to the assembly and maintenance of solar photovoltaic installations, in entities of public or private nature, companies of any size, both for its own account and for others, regardless of its legal form. The professional develops his or her activity depending functionally and / or hierarchically of a superior, if applicable. You can have staff in charge sometimes, seasonally or stably. Their professional activity is subject to regulation by the competent Administration. In the development of the professional activity, the principles of universal accessibility are applied in accordance with the applicable regulations.



	Professional competences standard – Poland
Psychophysical and health requirements, including contraindications to professional practice	X
	Work done by the renewable energy systems installer requires technical skills, sustainability, adaptability to different environments, the ability to work under time pressure, responsibility, ability to focus on the activities undertaken and openness to changes. The installer is required to interact with other employees. The installer should anticipate the effects of the actions taken, to do things at a fast pace and be able to work in a stressful situation. The installer is also required to be in a good state of physical and mental health; sense of balance, eyesight, hearing and psychomotor performance. Contraindication to the profession is the fear of heights, diseases limiting manual mobility, balance disorders, heart defects, respiratory diseases.

	Professional competences standard – Poland	Spanish Organic Law
Education and powers necessary to work in the profession	X	X
	A renewable energy systems installer should have basic vocational education within the mechanical or electrical field, completed with courses related to the installation of the RES equipment, i.e. electrical, sanitary, heating, cooling or mechanical devices. An employee not having the experience should work under the supervision of a supervisor. It is advisable to have a driving license of B category, since the work can be carried out in an open area and require mobility. An installer should continuously update his knowledge and improve professional skills, therefore, he should participate in the training courses organized by trade associations or specialized training centers. In the case of individual work, it is desirable to have a certificate of a given speciality installer – issued under the provisions of the relevant regulation to the Act.	The professional should accredit the qualification “Set-up and Maintenance of Solar Photovoltaic Systems”. There are two ways of obtaining the professional qualification: Through obtaining a VET Diploma Through professional evaluation and accreditation Citizens wishing to participate in the procedure of professional evaluation and accreditation must meet the following requirements: a) Possess the Spanish nationality, having obtained the certificate of registration of community citizenship or the family card of a citizen or citizen of the Union, or holding a residence permit or, of residence and work in Spain in force, in the established terms In the Spanish legislation on immigration and immigration. b) Be 18 years old at the time of enrolment, in the case of units of competence corresponding to qualifications of level I, and 20 years levels II and III. c) Have work experience and / or training related to the professional competences that they wish to accredit: In the case of work experience: justify, at least 3 years, with a minimum of 2,000 hours worked in total, in the last 10 years before the call was made. For Level I proficiency units, 2 years of work experience will be required with a minimum of 1,200 hours worked in total. In the case of training: justify, at least 300 hours, in the last 10 years before the call was made. For Level I proficiency units, at least 200 hours are required. In cases where the training modules associated with the unit of competence to be accredited contemplate a shorter duration, the hours established in those modules must be accredited.

	Professional competences standard – Poland	Spanish Organic Law
Opportunities for professional development, validation of competences	X	X
	A renewable energy systems installer after confirming the qualification within an exam and having been certified as an installer, after working under supervision, the acquisition of experience in the installation of equipment and performing installation of renewable energy sources and completing a training course on managing people, gains the ability to be promoted for an installation team manager. He is also allowed to run his own business. In larger companies, having numerous installation teams, a promotion up to the boss/manager of all installation teams level is possible, after completing training in management and health and safety regulations for managers. The installer may participate in qualification courses in skills for the installation of equipment and renewable energy systems and the operation of equipment and renewable energy systems, and after graduation, certify qualifications within the external examinations system organized by the Regional Examination Board. Their education and qualifications can also be developed by becoming a Devices and renewable energy systems technician, profession 311930.	Professionals qualifying for “Set-up and Maintenance of Solar Photovoltaic Systems” obtain a Spanish level 2 VET Medium Degree, which gives access to a Spanish level 3 VET Higher Degree. Through any of the two qualification ways described above, professionals can access a level 3 qualification. The directly related professional competence is “Organisations and Projects of Solar Photovoltaic Systems”.

	Directive PEiR NR 2009/28/WE	Professional competences standard – Poland	Occupational Standard for a job in Romania	Vocational/ Professional Trainer Occupational Profile Cyprus	Professional competences standard – Spain
Knowledge	X	X	X	X	X
	<p>The market situation of solar products and present cost and profitability comparisons.</p> <p>Ecological aspects, components, characteristics and size of solar systems.</p> <p>Selection of accurate systems and dimensioning of components.</p> <p>Identify the need for heat energy, logistics, fire protection, related funds.</p> <p>Design, installation and maintenance of solar photovoltaic and solar installations using heat.</p> <p>European technology standards and certification systems, such as solar Keymark.</p> <p>The provisions of national and community law.</p>	<p>Knowledge – knows and understands the basic facts, principles, processes, general concepts and relationships associated with the installation of renewable energy devices and systems, in particular knows:</p> <p>The rules and regulations of safety, ergonomics, fire protection and environmental protection within the installation of renewable energy devices and systems.</p> <p>Design documentation, diagnostic and runtime documentation of the renewable energy systems.</p> <p>Operation principles of renewable energy systems;</p> <p>Construction of objects in / on which are renewable energy devices are installed.</p> <p>Elements and hydraulic systems, energy, thermodynamics and electrical systems depending on the type of renewable source.</p> <p>Materials and technology of the renewable energy systems installations.</p> <p>Types of heat pumps and technologies of brine;</p> <p>Types of solar collectors and methods of installation, depending on the installation site.</p> <p>Types of photovoltaic panels and their installation methods, depending on the installation site.</p> <p>Types of wind turbines and conditions of technical regulations of the installation.</p> <p>Biogas production technologies and machinery used in the process.</p> <p>Energy plants and equipment for biomass processing.</p> <p>The construction and operation of tools,</p>	<p>Legal regulations on health and safety at work and in the field of emergency situations.</p> <p>Legal regulation in renewable energy systems domain.</p> <p>Environmental protection rules.</p> <p>Knowledge about elements, structure, functions, connectivity of a PV system.</p> <p>Technologies in PV systems.</p> <p>Rules for designing techniques and for determining the place of PV systems.</p>	<p>A spherical picture of the situation of the solar products market and cost/profit comparison and should cover all the ecological aspects, the characteristics, components and dimensioning of solar systems, the selection of precision systems and dimensioning of their components, the definition of heating requirements, fire protection, subsidies, health and safety issues, as well as design, installation and maintenance of photovoltaic and solar thermal systems. The training should also provide sufficient knowledge of European Standards that refer to technologies and certifications such as "Solar Keymark" as well as national and European legislation</p>	<p>1. General electrical engineering related to solar photovoltaic installations</p> <p>Nature of electricity. Properties and applications. Electric current. Electrical magnitudes. Magnetism and electromagnetism.</p> <p>Electrical circuits. Structure and components. Symbology and graphic representation. Circuit analysis.</p> <p>Protection systems. Batteries and accumulators. Classification, typology and characteristics.</p> <p>Main electronic components. Typology and functional characteristics. Photovoltaic effect. Systems</p> <p>Three-phase electric. Static and rotary electric machines. Typology and characteristics.</p> <p>Generators, transformers and motors. Load regulators. Investors.</p> <p>Measures of electrical magnitudes. Procedures. Measuring instruments. Errors in measure.</p> <p>Electrical safety.</p> <p>2. General operation of solar photovoltaic systems</p> <p>Global operation and configuration of a photovoltaic solar installation connected to grid.</p> <p>Global operation and configuration of an isolated photovoltaic solar installation.</p> <p>Storage and accumulation.</p> <p>Global operation and configuration of a support installation with small wind turbine generator.</p> <p>Systems of protection and safety in the operation of the installations.</p> <p>Specifications and description of equipment and constituent elements: panels, supports, followers</p> <p>Solar and anchors, inverters, accumulators, small wind turbines, generators</p> <p>Regulating and control equipment, measuring and protection equipment.</p> <p>Applicable regulations.</p> <p>3. Symbolic representation of solar photovoltaic installations</p> <p>Sketched system. Perspective. Electrical symbol.</p> <p>Representation of electrical circuits.</p> <p>Single-stranded and multi-stranded scheme.</p> <p>Functional symbolic diagrams and diagrams.</p> <p>4. Projects and Technical Memories of Photovoltaic Solar Installations</p> <p>Concept and types of projects and technical memories.</p> <p>Memory, plans, budget, specifications</p> <p>And safety and health study.</p> <p>Plans of situation. Detail and set plans. Diagrams, flowcharts and schedules.</p> <p>Procedures and operations of stakeout of the facilities.</p> <p>Computer equipment in representation and assisted design.</p> <p>Assisted Design Programs. Display and Interpretation of digitized plans. Basic operations with graphic files.</p> <p>1. Installation of solar photovoltaic panels</p> <p>Classification of electrical power supply facilities.</p> <p>Measurement of electrical magnitudes.</p> <p>Routes and general protection panels. Protections. Types and characteristics.</p> <p>Pipelines and pipelines. Drivers.</p> <p>Electrical and electronic equipment for protection, maneuvering and safety.</p> <p>Motorization and automatic solar tracking system.</p> <p>Types of panels. Specifications.</p> <p>Grouping and connection systems. Orientation and inclination.</p> <p>Shades. Solar tracking.</p> <p>2. Structures of subsection of photovoltaic solar installations</p> <p>Civil works: displacement and hoisting of equipment and materials. Types of efforts. Elementary calculus of Efforts. Resistant structures.</p> <p>Types. Materials. Supports and anchors. Resistance of the constructive elements. Waterproofing.</p> <p>Architectural and urban integration. Aesthetics and technique.</p> <p>Structures of monitoring systems. Structures of accumulation</p>

		<p>equipment and control and measurement instruments. Flowcharts and diagrams of renewable energy systems. Measuring systems and diagnostic systems in res installations. Technical configuration and programming of the renewable energy devices and systems. Quality standards and evaluation criteria of the installation process.</p> <p>Knowledge – knows and understands the basic facts, principles, processes, general concepts and relationships associated with the installation of renewable energy devices and systems, in particular knows:</p> <ul style="list-style-type: none"> – the rules and regulations of safety, ergonomics, fire protection and environmental protection within the installation of renewable energy devices and systems; – design documentation, diagnostic and runtime documentation of the renewable energy systems; – principles of maintenance and technical inspections of system devices; – removable parts of devices and systems; – principle of dismantling; – the rules of the installation use; – the types and causes of failure in RES installations; – the order of operations related to the dismantling of the devices and installations; – the provisions on the complaint; – technical documentation of the renewable energy devices and systems maintenance. 			<p>systems. Structures of Wind systems. Conventional generator sets.</p> <p>3. Assembly of circuits and electrical equipment of solar photovoltaic installations Determination and selection of equipment and elements necessary for the assembly from the planes of the installation. Organization of the assembly of circuits and electrical and electronic equipment of solar installations Photovoltaic. Techniques and procedures. Assembly of circuits and electrical equipment of solar photovoltaic installations. Assembly of circuits and electrical and electronic equipment of wind and generator support systems. Assembly of circuits and equipment Electrical and electronic accumulation systems. Interconnection of the different subsystems of solar photovoltaic installations. Tools and means used in the assembly. Techniques of utilization.</p> <p>4. Quality in the assembly of solar photovoltaic installations Quality in the assembly. Technical prescriptions and quality control sheets. Quality control of materials used in assembly. Quality in assembly operations. Basic economic and strategic aspects of quality. Processes of technical documentation of the quality. Procedures manual.</p> <p>5. Safety in the installation of solar photovoltaic installations Security plans in the assembly of solar photovoltaic installations. Prevention of professional risks in solar photovoltaic installations. Risks arising from monitoring systems. Risks derived from accumulation systems. Risks arising from wind support systems. Work areas. Security signage. Emergencies. Evacuation. First aid.</p> <p>1. Maintenance of solar photovoltaic installations General operation of a solar photovoltaic installation. Procedures and operations for taking measures. Checking and adjusting parameters to setpoints. Maintenance programs for solar photovoltaic installations. Manuals. Projects. Inspection and verification of mechanical installations. Inspection and verification of electrical installations. Critical faults. Regulation of application in the maintenance of photovoltaic solar installations.</p> <p>2. Mantenimiento preventivo de instalaciones solares fotovoltaicas Programa de mantenimiento preventivo. Programa de gestión energética. Seguimiento de energía generada. Evaluación de rendimientos. Operaciones mecánicas en el mantenimiento de instalaciones. Operaciones eléctricas de mantenimiento de circuitos. Equipos y herramientas usuales. Procedimientos de limpieza, engrase, relleno de fluidos electrolíticos, para elementos de las instalaciones auxiliares.</p> <p>3. Corrective maintenance of solar photovoltaic installations Troubleshooting. Procedures for electrically isolating the different components. Methods for the repair of the different components of the installations. Disassembly and repair or replacement of electrical and mechanical elements.</p> <p>4. Quality in the maintenance of solar photovoltaic installations Quality in maintenance. Technical prescriptions and quality control sheets. Quality tools applied to the improvement of maintenance operations. Technical documentation of quality. Reports and control parts. Maintenance manual.</p> <p>5. Safety in maintenance Security plans in the maintenance of solar photovoltaic installations. Prevention of professional risks in the field of maintenance of solar photovoltaic installations. Means and safety equipment. Personal protective equipment. Use and maintenance. Prevention and environmental protection. Emergencies. Evacuation. First aid. Work areas. Security signage. Application regulations.</p>
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	Directive PEIR NR 2009/28/WE	Professional competences standard – Poland	Description of the profession – Romania	Vocational/Professional Trainer Occupational Profile Cyprus	Professional competences standard – Spain
Skills	X	X	X	X	X
	ability to work safely using the required tools and equipment and implementing the safety codes and standards and identify plumbing, electrical and other hazards associated with solar installations ability to identify systems and their components specific to active and passive systems, including the mechanical design, and determine the components' location and system layout and configuration. the ability to determine the required installation area, orientation and tilt for the solar photovoltaic and solar devices using solar water heater, taking into account shading, solar access, structural integrity, the appropriateness of the installation for the building or the climate as well as the ability to identify different methods of installation suitable for roof types and the balance of components of the installation. skills, in particular with regard to photovoltaic systems, ability to adapt the electrical design, including determining design currents, selecting appropriate conductor types and ratings for each electrical	<p>Skills– perform simple tasks related to the installation of the renewable energy devices and systems according to the specific instructions in the partially changing conditions, in particular, can:</p> <ul style="list-style-type: none"> – follow the rules and safety regulations, fire protection and environmental protection during the renewable energy devices and systems installation. – use design and diagnostic documentation, operation and maintenance of devices for tasks implementation. – adapt technical solutions to existing environmental and construction conditions. – choose and operate the equipment, as well as measuring and controlling instruments. – install the equipment according to the documentation, and predict the sequence of the installation activities performed. – prepare and connect a heat source to the heat pump, and the heat pump to the central heating and hot water system. – attach and secure the solar panels and connect them to the hot water and central heating system. – attach and protect photovoltaic panels and connect the installations to the internal and external network (Off grid + On grid). – attach and secure wind turbines and connect them to internal and external networks (Off grid + On grid). – adapt heating equipment to biogas use. – set up and connect to the hot water and central heating system devices using biomass. – control the operation of the equipment after each stage of the installation. – program and configure controls installed. – assess the quality of installation works of the renewable energy devices and systems. <p>Skills – performs simple tasks</p>	<ul style="list-style-type: none"> – design solar system and make proposals for optimal solutions. – organization of the workplace. – ensuring the quality of the executed works. – maintenance of work equipment. – providing materials for construction works. – installing photovoltaic modules. – mounting the support structure of photovoltaic systems. – making electrical connections between photovoltaic system components. <p>ensure the maintenance of photovoltaic systems.</p>	<p>5. Ability to work and use the necessary tools and equipment with safety abiding to the codes and standards for safety and should also be able to identify plumbing, electrical and other risks that are related to the solar installations.</p> <p>6. Ability to recognize the systems and the components of active and passive systems including the mechanical design and the ability to determine the position of the components, the order and the configuration of the system.</p> <p>7. Ability to define the proper orientation and angle of the solar panel taking into account shading, solar access, structural integrity, and installation appropriateness for the specific building and climate as well as the ability to identify the appropriate methods for installations on a variety type of roofs and the equipment necessary for the installation.</p> <p>8. For the photovoltaic installations the ability to adjust the electrical design, ability to define amperage, selection of appropriate conductors and flows for each electric circuit, selection of the right size, capacity and position of each connected equipment and subsystem and selection of the right point of connection.</p>	<p>a) Analyze the most relevant functions, laws and rules of electricity, describing the functionality of the elements and electrical assemblies present in solar photovoltaic installations.</p> <p>b) Analyze the operation of photovoltaic solar installations connected to grid to determine their characteristics and elements related to its and assembly</p> <p>c) Analyze the operation of isolated photovoltaic solar installations and their support systems to determine their characteristics and elements related to its rethinking and assembly.</p> <p>d) To interpret projects and technical memories of solar photovoltaic installations connected to network to carry out rethinking operations and others related to its assembly.</p> <p>e) Interpret projects and technical memories of isolated photovoltaic solar installations with support systems to carry out rethinking operations and others related to their assembly.</p> <p>a) Elaborate work plans for the mechanical and electrical assembly of solar photovoltaic installations according to the projects or technical memories and the established working procedures.</p> <p>b) Analyze the prevention and safety measures regarding the mechanical and electrical assembly of solar photovoltaic installations contained in the safety plans of the companies in the sector.</p> <p>c) To carry out operations of assembly of structures of solar installations from the technical documentation, using the tools, equipment and suitable materials and acting under safety standards.</p> <p>d) Perform mechanical and electrical assembly operations and commissioning of photovoltaic solar installations from the technical documentation, using the tools, equipment and suitable materials and acting under safety standards.</p> <p>a) Analyze the general operation of photovoltaic solar installations to develop the maintenance plan.</p> <p>b) Analyze the prevention, safety and environmental protection measures regarding the</p>

circuit, determining appropriate size, ratings and locations for all associated equipment and subsystems and selecting an appropriate connection point	<p>related to the installation of the renewable energy devices and systems according to the specific instructions in the partially changing conditions, in particular, can:</p> <ul style="list-style-type: none"> - follow the rules and safety regulations, fire protection and environmental protection during the renewable energy devices and systems installation. - use design and diagnostic documentation, operation and maintenance of devices for tasks implementation. - instruct the user on the proper and safe operation of the installation. - perform periodic inspections of the installation. - diagnose faults in the operation of renewable energy systems. - replace worn parts. - replace parts and components damaged in the installation. - disassemble the installations of renewable energy sources. - follow the procedures for dealing with complaints concerning the renewable energy devices and systems. - gather documentation on the operation of renewable energy devices and systems. 			<p>maintenance of solar photovoltaic installations contained in the safety plans of the companies in the sector.</p> <p>c) Perform preventive maintenance operations of photovoltaic solar installations following the procedures and specifications of the maintenance plan of the installation.</p> <p>d) Perform corrective maintenance of photovoltaic solar installations according to established procedures to return them to their operating state within the established parameters.</p>
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	Professional competences standard – Poland	Description of the profession – Romania
Competences	<p style="text-align: center;">X</p> <p>Social competence KzS:</p> <ul style="list-style-type: none"> - is responsible for assembling and servicing of renewable energy devices, - adapts his behaviour to changes in the work environment, - works partially independently and takes cooperation within installing and servicing of renewable energy devices in organized working conditions, - assesses the impact of his actions within collaborative teamwork and takes responsibility for their consequences. 	<p style="text-align: center;">X</p> <ul style="list-style-type: none"> - improved communication skills. - team work.

Table 4.3. Comprehensive set of competency requirements for the trainer in partner countries

	Professional competences standard – Poland	Occupational Standard for a job in Romania	Vocational/Professional Trainer Occupational Profile Cyprus	Spanish Organic Law	Professional competences standard – Spain
Synthesis	X				X
Professional tasks	X	X	X		X
Components of professional qualifications	X		X		
The job description and the manner of its execution, the areas of the profession	X				X

occurrence					
Work environment (working conditions, machinery and tools, risks, work organization)	X				X
Psychophysical and health requirements, including contraindications to professional practice	X				
Education and powers necessary to work in the profession				X	
Opportunities for professional development, validation of competences				X	
Knowledge	X	X			X
Skills	X	X	X		X
Competences	X				
Units of competence		X			
elements of competences		X			

Table 4.4. Comparative analysis of competency requirements for the trainer

	Professional competences standard – Poland	Professional competences standard – Spain
	X	X
Synthesis	Lecturer at the courses (educator, trainer) can perform and supervise professional tasks related to the support of adults in lifelong learning. Due to the nature of the profession and area of operation, a lecturer is a theoretically trained specialist having practical experience in the field he teaches. Theoretical knowledge and practical experience relevant to the subject of the lecturer's course should be properly documented	To program, to impart, to tutor and to evaluate formative actions of the subsystem of professional formation for the employment, elaborating and using materials, means and didactic resources, orienting on the formative itineraries and professional exits offered by the labour market in its specialty, promoting in a permanent form the quality of training and didactic updating

	Professional competences standard – Poland	Occupational standard for Trainer in Romania	Professional competences standard – Spain
	X	X (UNITS of COMPETENCE)	X
Professional tasks	<ul style="list-style-type: none"> . Conducting the diagnose of training needs at different levels (local, businesses, individuals). . Preparing a scenario of training classes. . Conducting a lecture presenting knowledge and expertise. . Preparing and conducting exercises to shape and / or improve the skills of training participants. . Conducting the diagnose to assess the progress of course participants and to inform about the results. . Managing the group process during the classes. . Developing course materials, methodology and teaching aids to support the process of teaching-learning. . Designing a training program. . Preparing the training offer. 0. The preparation of financial plans of training courses. 1. Organizing and managing one's own training work. 2. Preparing a room and a practice position to carry out 	<ul style="list-style-type: none"> Planning training activities Running training activities Evaluating trainees and ensuring quality of training Applying Special methods and techniques of training Marketing training Design training programs Organizing programs and internships Evaluation, review 	<ul style="list-style-type: none"> UC1442_3: Programming training actions for employment, adapting them to the characteristics and conditions of the training, the profile of the recipients and the work reality. UC1443_3: Select, elaborate, adapt and use materials, means and didactic resources for the development of training contents. UC1446_3: Provide information and job guidance and promote the quality of vocational training for employment. UC1445_3: Evaluate the teaching-learning process in the training

	<p>activities.</p> <p>3. Participation in the organization of seminars, specialized and methodology conferences.</p> <p>4. Conducting the course.</p> <p>5. Practical and methodical cooperation with other teachers.</p> <p>6. Cooperation with authors of textbooks and teaching aids.</p> <p>7. Managing an organizational unit that provides training services.</p> <p>8. Conducting evaluation of their work.</p> <p>9. Conducting evaluation work of other teachers (class inspections, observations, supervisions).</p> <p>0. Training evaluation, including performance tests, i.e. the achievement of aims.</p> <p>1. Conducting research on the suitability of curricula, textbooks and teaching aids.</p>	and quality assurance for training programs	actions for employment. UC1444_3: Provide and tutor training actions for employment using techniques, strategies and didactic resources
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	Professional competences standard – Poland	Vocational/Professional Trainer Occupational Profile Cyprus
	X	X
Components of professional qualifications	<p>Components of professional qualifications</p> <p>K-1. Preparation and implementation of activities (lectures, workshops, training, exercises, demonstrations) during the course.</p> <p>K-2. Assessment and examination of students.</p> <p>K-3. Designing the course.</p> <p>K-4. Evaluation of training services.</p> <p>K-5. Conducting the course.</p> <p>K-6. Managing an organizational unit (team, workshop, training facility) providing training services.</p>	<ul style="list-style-type: none"> – Training needs analysis. – Designing programs/training modules. – Delivering training programs/modules. – Evaluating Training Programs/modules.

	Professional competences standard – Poland	Professional competences standard – Spain
	X	X
The job description and the manner of its execution, the areas of the profession occurrence	<p>Lecturer at the courses (educator, trainer) can lead educational activities within training for different profession and age groups in various types of institutions. Forms of training can be dedicated to gaining qualifications, professional development or covering universal needs, aspirations and ambitions of trainees (psychotherapeutic training, driving license courses, art history courses). A lecturer may conduct single classes or conduct classes that are part of a larger project. Moreover, being familiar with specific fields, a lecturer may: examine, give advice and consultation, participate in the coordination of activities relating to the preparation, evaluation and distributing among listeners (adult learners) methodological materials and teaching aids, supporting both learning in a group and self-education process.</p>	<p>This professional is located in all productive sectors, in the areas of vocational training for employment, either in the training offered by the competent departments, in demand or in alternation with employment, and other accompanying actions and support for training, or Within non-formal teachings.</p>

	Professional competences standard – Poland	Professional competences standard – Spain
	X	X
Work environment (working conditions, machinery and tools, risks, work organization)	<p>A lecturer's work within courses is usually individual. Sometimes, however, they can work in pairs or as a team</p>	<p>The professional develops his/her professional activity in the public and private, in centres or entities that impart vocational training for the use, for workers in active, in situation of unemployment, as well as to special groups. Their professional performance is carried out in companies, organizations and entities of a public or private nature, that impart training for their own account or for others. In the development of professional activity, the principles of universal accessibility are applied in accordance with current legislation.</p>

	Professional competences standard – Poland
	X
Psychophysical and health requirements, including contraindications to professional practice	<p>A lecturer's work at the courses requires constant and direct contact with the audience. An indispensable feature is the ease of speaking and writing. The ability to concentrate attention and at the same time its divisibility, precision and consistency of expression are also important.</p> <p>Working with a large group of people, often in different technical conditions, requires patience and skills to quickly adapt to the new situation.</p> <p>The nature of work also requires:</p> <ul style="list-style-type: none"> – A high emotional resilience, – The ability to harmoniously interact with others, – High degree of autonomy in planning activities, – Consistency in the implementation of the tasks planned, – The ability to plan and organize one's own work.
	Spanish Organic Law
	X
Education and powers necessary to work in the profession	<p>The professional should accredit the qualification "Teaching of Training for Employment". There are two ways of obtaining the professional qualification:</p> <ol style="list-style-type: none"> 1. Through obtaining a VET Diploma 2. Through professional evaluation and accreditation <p>Trainers are exempt from possessing Professional Certificate of Teaching of Training for Employment if they obtained:</p> <ol style="list-style-type: none"> 1) Official university degree of: Degree in Pedagogy, Psychopedagogy or Master in any of its specialties, or a university degree of graduate in the field of Psychology or Pedagogy or an official postgraduate university degree in those area. 2) Official university degree different from those indicated in the previous section and that is also in possession of the certificate of Pedagogical Aptitude or of the professional titles of Didactic Specialization and the Certificate of Pedagogical Qualification or a Master's University qualifying for the exercise of the Regulated professions of Compulsory Secondary Education and Baccalaureate, Vocational Training and the Official Schools of Languages. 3) Teaching experience: at least 600 hours in the last 10 years in vocational training for employment or in the education system.
	Spanish Organic Law
	X
Opportunities for professional development, validation of competences	<p>Professionals qualifying for "Teaching of Training for Employment" obtain a Spanish level 3 VET Higher Degree, which gives access to a Spanish level 4 (EQF = 6) Higher Education at University.</p> <p>The directly related professional university degrees are "Pedagogy" and "Psychopedagogy". The University Access Marks are linked to the marks obtained in the VET Higher Degree. They can also pass the open access test suitable to their age (<25 or >25) to increase their marks</p>

	Professional competences standard – Poland	Occupational Standard for a job in Romania	Professional competences standard – Spain
Knowledge	X	X	X
Additional Professional qualifications	<ul style="list-style-type: none"> – Techniques of communication. – Techniques of obtaining and processing information. – The principles of ergonomics, safety regulations, fire and environmental protection. – The rules of social coexistence. – Selected issues of labour law. – Principles of pleadings preparation, filing documents, conducting calculations. – Methods of solving problems. – Principles of first aid – Principles of work organization. – Principles of effective management. 	<ul style="list-style-type: none"> – Basic requirements of learning domain. – Knowledge about the occupational and/or training standard relevant to the program. – Design and organize of training activities. – Rules of safety, security and occupational health. – Knowledge, skills, and attitudes that will constitute the contents of training. – The rules of labour protection and fire prevention. – The main training methods. 	<p>1. Structure of vocational training for employment Subsystem of Vocational Training for Employment: characteristics and recipients. Supply training. Demand training and alternation for employment. Certificates of professionalism, training modules and training units: characteristics, structure. Training programs. Professional itinerary. National Qualifications System: professional qualifications.</p> <p>2. The didactic programming of training for employment Elements of didactic programming: objectives, didactic units, contents, methodology, timing, evaluation, materials and resources. The objectives: definition, functions, classification, formulation and drafting rules. The formative contents: typology. Criteria to differentiate the contents. Writing rules. Techniques for the sequencing of contents. Learning activities: typology, structure and writing criteria. Methodology for training: didactic methods and techniques. Means and didactic resources.</p>
General professional qualifications:			

<ul style="list-style-type: none"> – Principles of preparation and giving a presentation. – Health and Safety and fire regulations -general and within the area associated with the issues discussed during classes. – Rules for the drafting of texts (textbooks, teaching texts). – Taxonomies for educational purposes. – Rules of examination and assessment of listeners. – Characteristics of optimal means of teaching. – Self-knowledge about one's own styles– social, learning, leading others, preferred roles in the team. – Voice techniques and their significance. – Relaxation techniques. – The principles of ergonomics. – Rules of communication between people. – Ways of dealing with conflicts. <p>Basic qualifications for the profession:</p> <ul style="list-style-type: none"> – Current, general and specialized knowledge that is part of the training (K-1). – General, psychological knowledge (K-1). – Principles of teaching (teaching) (K-1). – Principles of didactic design(K-1). – Theoretical and practical teaching methods (K-1). – Andragogy (principles of adult learning) (K-1). – Modern technical means of teaching (K-1). – Psychological aspects of teaching assessment (K-1, K-2, K-4). – Critical analysis of information (K-1). – Stages of group development dynamics (K-1). – Ways to cope with a difficult participant of a training (K-1). – Negotiation techniques (K-1). – Principles of creating substantive and methodological materials and teaching aids (K-1). – Place of evaluation in the management of one's own development (K-1). – Principles of giving feedback (K-1, K-2, K-4). <p>Specialist qualifications for the profession:</p> <ul style="list-style-type: none"> – Basic principles of social research methodology (educational) (K-2, K-4). – Methods and tools for collecting qualitative and quantitative data (K-2, K-4). – Quantitative and qualitative analysis of data (K-2, K-4). – Methods for preparation and 	<ul style="list-style-type: none"> – Theoretical and practical knowledge in training area. – The relevant legislation on the assessment and certification of vocational skills. – Evaluation methodology – methods, techniques and procedures. – Theoretical and practical knowledge in training area. – Training methodology. – Techniques of active listening, feedback and persuasive communication. – Modern technologies of information and communication. – The national system of vocational training and related legislation. – Methods of analysis and diagnosis of training needs. – Analysing capacity to provide appropriate institutional programs. – Marketing education: methodology for market studies, studies of learning needs, positioning studies, implementation studies, development/ restructuring studies, impact studies. – The national system of vocational training and related legislation. – Methods of analysis and diagnosis of training needs. – Training methods. – Training methods. – Equipment and materials necessary for training. – Legal rules for the establishment of work units. – Ergonomics and legal conditions for supplementary facilities. – Occupational field of the training. – Training methodology. – The relevant legislation of the evaluation and approval of training and certification training programs. – Program evaluation methodology – methods, techniques and 	<p>Evaluation: typology, criteria and instruments.</p> <p>3. Timed planning in training for employment</p> <p>Didactic script, structure and contents.</p> <p>Systematization of information.</p> <p>Sequencing.</p> <p>1. Materials, means and didactic resources in the training actions for employment.</p> <p>Differences between media and didactic resources.</p> <p>Printed material: characteristics and types. Didactic guide.</p> <p>Slate and flipchart: characteristics, types.</p> <p>The overhead projector: features, types. Transparency</p> <p>The video: features and types.</p> <p>The multimedia projector: features and types.</p> <p>Computer applications: multimedia presentation, virtual simulator, among others.</p> <p>Internet: tools and utilities.</p> <p>2. Elaboration and adaptation of materials, means and didactic resources in training for employment</p> <p>Rules on intellectual property. Standards of elaboration.</p> <p>Design and adaptation of materials, means and didactic resources.</p> <p>Preparation of didactic script for different supports.</p> <p>3. Didactic use of materials, resources and resources in training for employment</p> <p>Standards of use in the classroom: printed material, blackboard, flipchart, overhead projector, video, projector</p> <p>Multimedia, computer applications and the Internet.</p> <p>The multimedia presentation: elements, functions and environmental conditions.</p> <p>Keys to make an effective presentation: structure and didactic use.</p> <p>1. Professional orientation in training actions for employment</p> <p>Professional and work profile: professional working environment. Functional and technological environment.</p> <p>Professional experience. Professional skills and abilities.</p> <p>Personal, aptitudinal and attitudinal characteristics.</p> <p>Knowledge and interests.</p> <p>The techniques of job search and self-employment: tools.</p> <p>Professional itinerary of employment and training: personal, professional and psychosocial indicators. Professional outings.</p> <p>Statistical information on the labour market. Fields of employment of the specialty.</p> <p>Databases for obtaining addresses of companies in the sector</p> <p>Documentation and specialized magazines.</p> <p>2. Quality in training for employment: definition and areas</p> <p>Tools and techniques for quality improvement.</p> <p>Follow-up plan: concept, characteristics and purpose. Agents involved. Coordination actions.</p> <p>Strategies for improvement. Schedule. Evaluation procedures.</p> <p>The labour market: impact of the new technologies of the specialty. Analysis of relevant data.</p> <p>Professional exchange: meetings, seminars, congresses, associations and professional networks.</p> <p>Professional innovation: innovation and change strategies.</p> <p>Sources of information for technical and pedagogical updating.</p> <p>1. Assessment of learning in training for employment</p> <p>Evaluation: concept, modalities. Standard and criterion. Types of evaluation. Technical characteristics of the evaluation: reliability, validity. Evaluation tools and techniques according to results and types of learning:</p> <p>Knowledge tests: evaluation of simple learning. Table of specifications. Types of items and rules of elaboration and correction. Instructions for the application of the tests.</p> <p>Evaluation of complex learning: interpretative exercise, test tests. Rules for the elaboration and correction of complex learning tests.</p>
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	<p>presentation of results (K-2, K-4).</p> <ul style="list-style-type: none"> Principles and methods of measurement of teaching (K-2, K-4). Regulations specifying the authorization of the use of teaching materials (K-1, K-3, K-5). 	<p>procedures.</p> <ul style="list-style-type: none"> Evaluation systems and quality certification – ISO, EFQM etc. 	<p>Practice tests: check lists, rating scales, practice evaluation sheets: Criteria for preparation and correction, instructions for the application of tests.</p> <p>2. Evaluation of the training process for employment Evaluation criteria and indicators. Qualitative and quantitative techniques for collecting information. Observation and registration sheet: rules of elaboration and use. Rules for the preparation of questionnaires. Tracking sheets. Reports of monitoring and evaluation of training actions and training units. Follow-up plan: elements, characteristics, improvement and reinforcement strategies. Quality control and evaluation: effectiveness, effectiveness and efficiency.</p> <p>1. Psychopedagogical aspects of apprenticeship in vocational training for employment The teaching-learning process in the formation of adults: concept, elements. The teacher and the student: functions, characteristics. Learning: concept, characteristics, types. Learning triggers: attention, memory Motivation: process, actions and techniques. The theory of communication and the learning process. The process of communication. Interferences and barriers in communication. Training as a communicative process. Verbal and non-verbal communication in the formative process. The dynamics of learning in the group: characteristics, types, phases of group development. The address of the group. Group techniques.</p> <p>2. Methodological strategies in vocational training for employment Teaching methods: concept. Methodological strategies. Elements influencing the choice of methodological strategy: learning outcomes, learning group, contents, resources, organization. Autonomous learning strategies. Teaching skills. Didactic styles. Teaching functions. The training session: structure, characteristics of the didactic exhibition, use of materials, resources and resources. The teaching simulation: micro-teaching and autoscopy.</p> <p>3. Modalities of vocational training for employment Characteristics and types: face-to-face, distance learning, teletraining and mixed. Communication on line. The role of the tutor and his / her roles: active, proactive and reactive. Functions. Organization and planning of actions. Coordination of groups. Search for solutions. Supervision and monitoring of learning. Tutorial skills. Criteria for the timing of the tutorial action. Individualized action plan.</p>
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	Professional competences standard – Poland	Description of the profession – Romania	Professional competences standard – Spain
Skills	X	X	X
	<p>Additional professional qualifications:</p> <ul style="list-style-type: none"> Communicates effectively. Searches and processes information. Uses information technology (including the use of information resources on the Internet, uses e-mails, a word processor, spreadsheet and databases). Organizes workplace according to ergonomic principles, safety, labor protection and environment regulations. Adheres to the principles of social coexistence. 	<p>1.1. The objectives are relevant for knowledge and skills acquiring and compliant to the requirements of the occupation.</p> <p>1.2. The operational objectives are formulated in terms of learning outcomes – what the trainees will be able to make at the end of the training.</p> <p>1.3. The operational objectives are appropriate to the trainees' individual characteristics.</p> <p>1.4. The operational objectives are appropriate to the needs of trainer.</p> <p>2.1. Training activities are defined according with set of operational objectives.</p>	<p>C1: Analyze the regulations on Vocational Training for employment identifying their characteristics and target groups.</p> <p>C2: Apply techniques of teamwork in relation to technical and professional training for the development of training actions.</p> <p>C3: To elaborate the didactic program of a formative action differentiating its constituent elements.</p> <p>C4: Program timed educational units sequencing contents and activities.</p> <p>C1: Apply criteria of selection of materials,</p>

<ul style="list-style-type: none"> – Behaves ethically. – Distinguishes and respects the basic rights of employers and employees. – Solves problems and makes decisions in terms of his powers. – Performs basic calculations. – Creates and conducts systematic documentation of work. – Develops professionally, plans and implements his own career path. – Performs self-esteem. – Copes with stress. – Adjusts to changes. – Provides first aid. – Initiates the introduction of technical and organizational solutions that improve the conditions and quality of work. – Distinguishes between tasks performed by individual organizational units. – Manages people effectively. – Manages budget economically. 	<ol style="list-style-type: none"> 2.2. Training activities are adapted to individual characteristics of trainees. 2.3. Training activities are defined according to training group size. 2.4. Training activities are defined according to resources available to the training provider. 2.5. Learning contents are appropriate with learning targets. 2.6. Learning activities are organized from simple to complex in order to ensure objectives achievement. 3.1. Designed learning situations, materials and expected equipment are suitable for targeted objectives and skills. 3.2. Assessment methods and tools match with provided learning situations set. 3.3. Assessment methods and tools meet the needs of the target group. 3.4. Training barriers – related to training conditions or to participants – are identified, assessed and their effect must be diminished. 	<p>means and didactic resources in function of the formative actions.</p> <p>C2: Elaborate didactic materials that favor the acquisition of learning.</p> <p>C3: Use materials, means and didactic resources according to technical specifications, safety and environmental health standards, according to a training context.</p>
<p>General vocational qualifications:</p> <ul style="list-style-type: none"> – Applies rules correctly, prepares and carries out presentations within the general and specialized knowledge. – Uses correct professional and didactic terminology. – Uses audio-visual aids in order to conduct a lecture. – Properly supports the teaching aids necessary to conduct the exercise. – Uses a computer for the preparation of text materials, graphics and presentations using specialized programs. – Plans his own actions. – Uses various sources of information. – Organizes and classifies information from the point of view of their suitability for the objective completion. – Clearly formulates and communicates his expectations. – Conducts negotiations successfully. – Constructively reacts to changes. – Performs evaluation of his work. – Uses the evaluation conclusions to improve his work and plan his own development. 	<ol style="list-style-type: none"> 4.1. Training conditions are provided with the respect of legislation and training program. 4.2. Training conditions are suitable to the individual characteristics of participants. 4.3. Equipment and materials are available when it is expected to be used in the training process. 4.4. Visual materials used are visible and attractive. 4.5. Resources and training materials are accessible to the trainees. 5.1. Venue of each training activities is selected and organized according to the objectives and competences to be achieved. 5.2. The arrangement of the workspace facilitates the communication between the trainees and between them and trainer. 5.3. Training area is clearly distinguished from the location for breaks and relaxation. 5.4. Participants have access to training facilities: bathroom, restroom, seating areas. 5.5. Equipment/materials required for training activity are available from the beginning throughout the training program. 5.6. Equipment is checked before starting activity. 6.1. The course is adapted to the needs and characteristics of target group. 6.2. The course and the supporting materials are up to date and contain all the necessary information for achieving the training objectives. 6.3. The course and the supporting materials are relevant for achieving the training objectives and for getting the targeted skills by the trainees. 	<p>C1: Define information channels for the identification of professional contexts that facilitate decision making in processes of insertion or professional promotion.</p> <p>C2: To encourage the active participation of each student in his process of information and professional orientation.</p> <p>C3: To elaborate procedures of transmission and advice on the professional and productive environment that make possible the updating of the information.</p> <p>C4: Plan professional updating procedures and innovation strategies, specifying pathways and exchange learning activities with other professionals.</p> <p>C5: Select methodological strategies that contribute to improving the quality of the learning process.</p>
<p>Basic qualifications for the profession</p> <ul style="list-style-type: none"> – Formulates training goals based on his knowledge of the subject(K-1, K-3). – Develops classes' scenarios (K-1). – Assesses the suitability of content for participants and makes the appropriate selection according to expectations and perception capabilities of recipients (K-1, K-4). – Selects the methods of guiding the activities to suit the purpose and the level of participants (K-1, K – 3). – Selects forms of teaching taking into account the organizational framework, institutional and financial (K-1, K-3). 	<ol style="list-style-type: none"> 1.1. Participants are informed about the training program and daily / weekly activities. 1.2. Participants are informed about training objectives and assessment methods. 1.3. Participants are informed about training learning spaces and available facilities. 1.4. Participants are taught on training specific conditions about health and safety (SSM) and fire prevention and firefighting. 	<p>C1: Analyse the purpose and types of evaluation that facilitate the adequacy of the training level to the profile of the students.</p> <p>C2: Elaborate tests and evaluation instruments with objective criteria, providing the guidelines for their use in a training action.</p> <p>C3: Elaborate criteria and select evaluation indicators that determine the level of learning achieved by the students of the training action and provide information on the training process.</p> <p>C1: To establish strategies that facilitate the learning of adults, prior to the formative action.</p> <p>C2: Generate channels for the active participation of students in the development of training actions.</p> <p>C3: Select communication techniques that are applicable in the training action.</p> <p>C4: Analyse methodological strategies that favour the acquisition of professional skills.</p> <p>C5: Determine tools to monitor the student learning process by providing personalized help strategies when needed.</p>

<ul style="list-style-type: none"> – Selects teaching aids suitable for purpose and perceptive abilities of participants (K-1, K-3). – Introduces activities effectively during the period for their implementation (K-1). – Learns about the interest of the students (K-1). – Prepares the optimum space to carry out exercises (K-1). – Conducts training using alternative methods chosen for the purpose and capabilities of participants and the hardware while maintaining safety and fire regulations. (Q-1). – Determines optimal space for classes (K-3). – Provides feedback for the participants on the learning effects (K-1, K-2, K-4). – Effectively manages the group process at every stage of the group development (K-1). – Deals with conflict situations without harm to the group and learning process (K-1). – Develops substantive and methodical materials in accordance with the methodology of creating materials to support education and self-education (K-1, K-3). – Responds flexibly to changes within the demand for specific education forms (K-1). – Gathers feedback from trainees on the classes efficiency (achieving the objectives) (K-4). 	<ol style="list-style-type: none"> 2.1. Specific work tasks are adapted to the specific individual trainees. 2.2. The tasks are clearly formulated. 2.3. Trainer behaviour is adapted to the individual and to the group characteristics of trainees. 2.4. Trainer's eye contact with participants is maintained throughout training activities. 2.5. Trainees are encouraged to have initiative and to express their views, dilemmas and emotional states. 2.6. Personal experience of participants is used in training process. 2.7. It is encouraged self-assessment. 2.8. Special attention is given to participants need and special learning difficulties.
<p>Specialist qualifications for the profession:</p> <ul style="list-style-type: none"> – Designs training according to recognized needs (K-3). – Defines personal and material requirements necessary to achieve the objectives of the training (K-3). – Create a training schedule according to the didactic rules of (K-3).– Designs and uses teaching aids in accordance with the principles of teaching (K-1). – Organizes optimal space to teach in the form of activities (K-1). – Prepares space for exercises to ensure the optimum conditions for participants' learning process (K-1). – Plans and develops tests to diagnose training needs (K-1, K-4). – Measures the knowledge and skills covered within the training topics (K-2, K-4). – Writes the study report (K-1, K-2, K-4). – Prepares sets of examination tasks (K-2). – Presides an examination team (K-2). 	<ol style="list-style-type: none"> 3.1. Dress trainer is suitable for learning situations. 3.2. Agreed work program is followed, except the cases of force majeure. 3.3. Individuals units or groups are formed in accordance with the law. 3.4. Participants are encouraged to have a pro-active attitude. 3.5. Methods, techniques and training procedures used are suitable for conducting concrete training program. 3.6. Methods, techniques and training procedures are effectively adapted to the individual characteristics of trainees. 3.7. The trainer will offer opportunities to all participants to practice the skills and apply knowledge. 3.8. Physical safety of trainees, security standards and occupational health are respected.
	<ol style="list-style-type: none"> 4.1. Conflicts between participants are identified and resolved following the principle of equity. 4.2. Conflict resolution is made taking into account the characteristics of the individuals involved. 4.3. Where appropriate, the trainer asks help for conflict resolution, from other persons or institutions. 5.1. Behaviours that indicate goals achievement are identified and recorded. 5.2. Information about the objectives and skills target is offered permanent to the trainees. 5.3. The performances of trainees indicating achieving the targets are communicated to them. 5.4. Participants are involved in offering constructive feedback for colleagues. 5.5. The teacher applies methods and assessment tools which are discussed with the trainees. 5.6. Feed-back offered during training is associated with positive incentives and direct critics are avoided. 5.7. Feed-back at the end of the course is associated with recommendations for further development.
	<ol style="list-style-type: none"> 1.1. Assessment of trainees is achieved with the methods and tools recommended in the training program. 1.2. Essential behaviours indicating objectives achievement are identified in the trainees'

behaviour.

- 1.3. Participants are informed about assessment methods at the beginning of each test.
- 1.4. Assistance on the use of evaluation instruments is given to participants, throughout evaluation test.
- 1.5. Participants are informed about evaluation samples used during and at the end of the training program.
- 1.6. Samples of evaluation are applied taking into account the general principles of assessment.
- 1.7. Samples of evaluation are applied taking into account the individual characteristics of participants.
- 1.8. Participants receive feedback from the trainer about evaluation results in concordance with training objectives.
- 1.9. The trainer develops and applies formative assessment tools that are discussed / negotiated with the trainees.
- 2.1. Evaluation sessions are organized in accordance with the law.
- 2.2. Evaluation sessions are organized in accordance with the trainer's institution policies.
- 2.3. Assessment instruments used are pre-tested.
- 2.4. Assessment tools used are tailored to participants with special needs.
- 3.1. Registration of evaluation results is made in the agreed format with respect of legal statements.
- 3.2. Assessment records are completed in accordance with applicable laws.
- 3.3. The evaluation report has the legal format and content under and it is consistent with training provider requirements.
- 3.4. The evaluation report is consistent with policies and requirements of the training provider.
- 1.1. Trainees are given systematically occasions and situations in order to demonstrate their practical experience.
- 1.2. Critical reflection of participants over courses and personal opinions are encouraged.
- 1.3. Trainees have opportunity to express their autonomy, through study and practice individual or self-led group.
- 1.4. Domain language development is encouraged.
- 1.5. Methods and techniques of persuasive communication are mainly used.
- 2.1. Teamwork and self-organizing team are encouraged.
- 2.2. The methods used in a group must be appropriate to objectives and content of training.
- 2.3. The trainer encourages and supports group with students that have learning or practical difficulties.
- 2.4. People with special needs are integrated into groups / work teams.
- 2.5. Participants with experience above average knowledge level of the group are used as training resources.
- 3.1. Programs and training sessions are designed, where appropriate, jointly with other trainers.

- 3.2. The role of the trainer is changed if is needed, in the co-trainer / co-facilitator training.
- 3.3. Different stages of training process are given to co-trainers according to their skills and performances.
- 3.4. The trainer provides consultancy for defining the training needs, develop training programs, assessment the training.
- 3.5. The trainer provides information about the documents for certification after pursuing a training program.
- 4.1. Training procedures are sufficiently varied to meet the needs / expectations of individual or group of trainees.
- 4.2. Unexpected situations and occurring conflicts are used in formative purposes.
- 4.3. Elements of the work program are negotiated with trainees for optimization purposes.
- 4.4. Non-formal and formal learning and trying and error based learning.
- 4.5. Formative assessment results are used to improve training process.
- 5.1. The trainer follows language rules (correct expression, consistent).
- 5.2. Trainees are supported in domain's vocabulary acquisition.
- 5.3. Trainees are supported for orientation in the labour market and society.
- 5.4. Participants are encouraged to use different media and communication methods and to work in a team.
- 5.5. Trainees and training candidates receive, upon request, conciliation for further professional development.

Training needs and demand for training are identified by the training expert through various methods and specific instruments. At the same time, training programs should be promoted in the market of training programs, in order to inform and attract possible clients and beneficiaries.

Training expert is involved in designing of training programs starting from objectives. Training programs have goals and benchmarks to be developed starting from qualification standards and existing training programs. Beginning from these goals and objectives, programs are broken down into sub-modules.

Before implementing the training program, it is necessary that all conditions – logistics and intellectual – to be provided, including, where necessary, facilities for transportation, meals and accommodation for trainees or trainers. In addition, the program as a whole will be negotiated, where needed, with representatives of the employer or training provider. At the same time, must be obtained in advance all legal authorizations required for carrying out training

The evaluation covers the entire training program, but also the trainer. Depending on the evaluation results, program will be reviewed, optimized and adapted to the needs and the demand for training.

	Professional competences standard – Poland	Description of the profession – Romania
Competences	X	X
	<ul style="list-style-type: none"> – Communication skills. – Willingness to learn and update ones knowledge. – Ability to think logically. – Concentration and divided attention. – Suitability to work in a team. – Imagination and creative thinking (creativity). – Flexibility in action. – Openness to new experiences and people. – Independence. – Responsibility. – Emotional resistance. – Ability to work under stress. – Ability to make quick and accurate decisions. – The ability to persuade others. – Tolerance, respect for others, patience, kindness. – Ability to accept oneself and identify with one’s own action. – Sense of humour. – Imagination and creative thinking abilities. – Emotional resistance. – Demonstrating self-control. – Demonstrating independence. – The ability to connect with people. – The ability to empathize. – Ability to make quick and accurate decisions. – -Ability to cooperate. – -Leadership abilities. 	<ul style="list-style-type: none"> – Improved communication skills. – Team work. – Abilities to use training methods. – Capabilities to motivate trainees and to involve participants to training activities.

5. Conclusions and recommendations

Conclusions on the analysis of competency requirements for trainer PV:

- 1) In Poland, Romania, Spain and Cyprus there wasn't introduced the profession of PV trainer into any classification, therefore there is no direct description of the professional competence.
- 2) Professional competence of PV trainer will be described on the basis of the pedagogical and professional competence related to the installation and service of the PV devices (Poland, Spain, Romania, Cyprus).
- 3) Training of the PV installations are providing by the accreditation training centres (Poland, Spain, Romania, Cyprus).
- 4) In Cyprus, PV trainers based on the CV sent are approved by The Energy Service of the Ministry of Energy, Commerce and Tourism.
- 5) Training centre is responsible for the picking of the trainer (Poland, Romania, Cyprus).
- 6) Spanish partner has described the whole requirements for PV trainer.
- 7) The training programme for PV installers are available for people who has electrician or plumber's qualifications.
- 8) The content of the competence requirements for the PV trainer vary in separate countries.
- 9) The common part of the profession competence description is presented by knowledge, skills and social competence.
- 10) It is recommended to prepare the professional competence in scope of the PV installation on the basis of the requirements of knowledge and skills mentioned in the annex IV Directive of the EU Parliament and Council No. 2009/28/WE from 23 April 2009 as the promotion of the renewable energy.

Recommendations

As part of the recommendation, a description of the structure of the proficiency profile of the PV trainer is presented, which should include:

- 1) The name of the profession, the link with EQF / NQF levels.
- 2) Synthetic description of profession / competence.
- 3) The job description, the areas of the profession occurrence.
- 4) Work environment (working conditions, machinery and tools, risks, work organization).
- 5) Education and powers necessary to work in the profession.
- 6) Opportunities for professional development, validation of competences.
- 7) List of professional tasks.
- 8) List of professional competencies.
- 9) List of required knowledge.
- 10) List of necessary skills.

The above elements of the profession description should be components of the professional competence standard for the trainer. Therefore, the collected data from the comparative analysis will be used to draw up a description of the professional qualification standard for the PV trainer, which will consist of two professional competencies: necessary for assembly of PV installations and conducting classes with trainers.



Result 2. METHODOLOGY OF DEVELOPING THE PROFESSIONAL COMPETENCE STANDARD FOR PHOTOVOLTAIC TRAINER

For the purposes of developing the methodology of developing the professional competence standard for the photovoltaic trainer, data prepared by the partner countries of the project will be used as a result of the results of the study and the comparative report on occupational requirements (skills and competencies) for a photovoltaic trainer in the partner countries.

In the above report, the partner countries presented, among others. Procedures for creating and structuring professional qualification standards.

The national reports of Poland, Spain, Romania and Cyprus show that:

- 1) Professional competence standards are established in Poland, Romania and Spain. A Cypriot partner has reported in his report that such work has just begun.
- 2) Elaboration of standards of professional competence is carried out by specialized institutions, in Poland it is the Ministry of Labour and Social Policy, in Spain – INCUAL (Spanish National Institute of Qualifications) is a public agency based on the State Ministry of Education, Culture and Sports in Romania – National Qualification Authority – NQA, Cyprus National Qualification Standards is Human Resource.
- 3) The procedures for creating the description of the standards are varied, and the project's own methodology for the development of a professional competence standard for the PV trainer should be developed for the project, which will be accepted by all project partners.
- 4) The structure of the description of professional competency standards in project partner countries is varied (Table 2.1).

Table 2.1. Structures of professional competency standards in partner countries of the project

	Professional competences standard – Poland	Occupational Standard for a job in Romania	Professional competences standard – Spain
Synthesis	X		X
Professional tasks	X		X
The job description and the manner of its execution, the areas of the profession occurrence	X		X
Work environment (working conditions, machinery and tools, risks, work organization)	X		X
Psychophysical and health requirements, including contraindications to professional practice	X		
Education and powers necessary to work in the profession	X		
Opportunities for professional development, validation of competences	X		
Knowledge	X	X	X
Skills	X	X	X
Competences	X	X	
Units of competence		X	
elements of competences		X	

Methodology for creating a standard of professional competence

As part of the project partnership, it was assumed that:

- 1) The methodology will include the following phases: creation, evaluation and modification (adaptation) standard of professional competence which will describe:
 - the structure of the standard of professional competence, including the type of information, the level of detail of description,
 - the range of the data (referring the structure of the standard of competence) and the data collection procedures regarding the employers' requirements as for the competencies necessary to perform the job;
 - the data collection tools (research questionnaires);
 - a description how to analyse the collected data and determine the competencies with regard to the units of learning outcomes;
 - procedures for consultation and approval of the standard.
- 2) The methodology will refer to European instruments related to the development and quality of qualifications (EQF/NQF, ECVET, EQAVET).
- 3) Key players in the creation and verification of the description of the standard will be representatives of employers, professional organizations, professional associations.
- 4) The standard model will be based on the analysis of professional tasks.
- 5) Professional tasks will be the basis for the separation of professional competencies.
- 6) It will consider descriptors of professional competence (knowledge, skills, social skills) thanks to which a coherent rules for determining the training modules (including the ECVET points and areas of competence tests) can be specified.
- 7) An integral element of the methodology will be the cyclical evaluation and modification of the standard of professional competences developed in order to make it adaptable to changing conditions and technological progress.

Taking into account the above, the following procedure has been adopted for the development of a description of the professional qualification standard for trainer PV:

Phase 1. Development on the basis of the results of comparative analysis of the competency requirements common to the project partnership of the professional qualification standard for the trainer PV. The design should also take into account the specificity of the individual countries.

Within this stage, a team will be formed, consisting of representatives from all partner institutions of the project. The task, which will be to prepare a proposal to describe the profession of trainer PV, including a list of professional tasks and competences and a description of competence in terms of knowledge, skills, social competences.

Phase 2. Development of the research questionnaire – a tool for developing the professional competence standard

The purpose of this action is to develop the research questionnaire which is a tool for the creation of the standard of professional competence for the photovoltaic trainer, including: (1) development of a questionnaire template which is then filled with content based on the analysis of the information received from the partners, (2) the completion of the questionnaire taking into account learning outcomes units – assignment of descriptors: knowledge, skills and social competence (O1) to the tasks/professional qualifications.

A preliminary version of the questionnaire will be subject to consultation.

The research questionnaire to identify the requirements for the standard of professional competences is a success indicator.

Phase 3. Conduct pilot studies

The pilot studies are aimed at improving the research tool in each of the partner countries. Each partner will conduct at least 2 researches and will prepare at least 2 questionnaires. The conclusions will be passed to the output coordinator who on the basis of received answers will improve the requirements for the standard of professional competences.

Phase 4. Conduct target research in partner countries.

In the next phase, there will be conducted the proper research that improve the requirements for the standard of professional competences. In each partner country there will be conducted at least 10 interviews with the representatives of training institutions, employers, businesses, associations, foundations related to photovoltaic and pedagogical qualifications. The respondents should be e.g.: immediate superior of an employee in a given profession (e.g. project leader), a specialist. In case of difficulty in recruiting respondents having executive positions, the opinion of experienced employees should be considered. After the studies, a report will be prepared in English.

There will be prepared national research reports in the partner countries and research summary report.

The research report on creating standards of professional competences is a success indicator.

Phase 5. The initial version of the professional competences standard for the photovoltaic trainer

According to the uniform methodology of creating standard of professional competences – a preliminary version of the standard will refer to European instruments related to the development and quality of qualifications (EQF/NQF, ECVET, EQAVET) and specific elements existing in each partner country.

The success indicator is the first version of the standard of professional competences.

Phase 6. Consultation and quality assessment reports from each partner country and summary report on the verification of the professional competence standard (in English)

Multi-faceted and multi-level assessment of the standard of (qualitative strategy) will ensure the widest possible international consultation on the final version of the standard. Therefore, the substantive and methodological assessment will be carried out in all the project partner countries. The project partners in cooperation with the leader of this activity will organize meetings with 2-3 external experts possessing experience in the target profession. The assessment process will be documented in written with the clear indicators of changes.

Phase 7. The final version of the standard of professional competences for the photovoltaic trainer (in English and the national languages of the partner countries)

Based on the improvements of external experts there will be prepared improved standard of professional competences for the photovoltaic trainer. It will be translated into national languages of the partner countries.

Structure of professional competence standards for PV trainer

Taking into account the obtained information from the national reports, the following structure of the professional qualification standard for the PV trainer was proposed:

1. Identification of the profession

1.1. The name of the profession and position of the profession in the classifications

2. Description of the profession

2.1. The profession synthesis

2.2. The job description and the manner of its execution, the areas of the profession occurrence

2.3. Work environment (working conditions, machinery and tools, risks, work organization)

2.4. Education and permissions necessary to work in the profession

- 2.5. Opportunities for professional development, validation of competences
- 2.6. Professional tasks
- 2.7. List of professional competence
- 2.8. Relations between professional competence and the level of skills in the EQF / NQF
- 3. Description of professional competence
 - 3.1. Kz1
 - 3.2. Kz2
 - 3.3. Social competence KzS
- 4. Profile of key competences

The proposed structure contains elements specific to professional competence standards in Spain, Romania and Poland.

6. Professional competence standard for the photovoltaic trainer

The chapter presents the standard for professional competences for the photovoltaic trainer developed by the project partnership.

1. Position of a profession (competences) in classifications

1.1. Planning, organizing, conducting and evaluating of the vocational training (VET trainer)

International Standard Classification of Occupations (ISCO-08)

- group 2424 Training and staff development professionals

European Qualifications Framework

- level 5 (minimum)

1.2. Planning, installation, modernization and maintenance of photovoltaic installations (photovoltaic installation fitter) 7126

International Standard Classification of Occupations (ISCO-08)

- group 7126 Plumbers and pipe fitters

European Qualifications Framework

- level 3 (minimum)

2. Description of the profession

2.1. The profession synthesis

The PV trainer participates in the design, organization, implementation and quality assurance of the training process for PV installation fitters and their qualifications in non-formal education and learning.

2.2. The job description and the manner of its execution, the areas of the profession occurrence

PV trainer participates in identifying the training needs of employees, creating curricula, didactic materials and methodological elaborations specific to certain professions, as well as undertakes promotional activities and disseminating the training offer combined with the granting of professional qualifications. His contribution to the documentation of educational activities should in

particular manifest itself in adjusting the content of education to the requirements of workplaces in enterprises. It should also ensure that didactic positions meet the requirements of occupational health and safety and the development opportunities of young workers and adults.

The task of the PV trainer is also to check, provide advice and consultation to teachers, lecturers and instructors, participate in preparing, giving opinions and making available to students and listeners methodological materials and teaching aids that support both group learning and self-education.

The PV trainer can also conduct individual classes (mentoring, career counselling) or as part of a larger curriculum.

In the didactic activity, PV trainer uses, depending on the age group, rules related to teaching adults and youth. Knows and applies teaching and learning strategies, activating and practical teaching and learning methods as well as procedures and tools for pedagogical evaluation. When creating a program offer, he uses methods and tools for analysis of training needs as well as descriptions of qualification and competency requirements for professions in which he conducts classes. He is also an active promoter of vocational training combined with acquiring new or expanding his competences and qualifications.

The trainer conducts theoretical and practical classes. The aim of the classes in the field of non-formal education and informal learning may be to prepare a newly employed employee to work on the position, familiarize the employee with new technology, materials, tools and work methods, supplementing gaps in the employee's professional competence, solving individual problems related to functioning in the work environment.

2.3. Education and permissions necessary to work in the profession

The PV trainer is prepared theoretically and practically to conduct classes. The minimum requirement as regards the entitlement to teach in the formal system is the completion of the qualification course in the field of pedagogical preparation (level 5 of the European Qualifications Framework) and related pedagogical practice. In the non-formal system, this requirement is not obligatory but desirable due to the good of the participants of the classes.

In addition, PV trainer has theoretical knowledge and practical experience in the profession and specialties in which he conducts educational classes. His knowledge, skills, social competences and professional experience are adequate to the problems of the classes and should be properly documented. The minimum level of education and qualification is ensured by a diploma and the title of skilled worker, technician or engineer in the profession (levels: 3rd, 4th and 6th European Qualifications Framework).

In Poland, PV trainer:

1) conducting theoretical classes, should have:

- a) higher technical education or completed post-graduate technical studies confirmed by a diploma or certificate issued on the basis of the provisions of the Act of 27 July 2005 - Law on Higher Education (Journal of Laws of 2012, item 572, as amended)), and a documented professional training of three years, or
- b) technical secondary education confirmed by a diploma confirming professional qualifications, issued on the basis of the provisions of the Act of 7 September 1991 on the system of education (Journal of Laws of 2004 No. 256, item 2572, as amended), or an equivalent document, and a documented five-year apprenticeship;

2) who conducts practical classes, should:

- a) meet the eligibility requirements set out in point 1 or
- b) basic vocational education confirmed by a diploma confirming professional qualifications, issued on the basis of the provisions of the Act of 7 September 1991 on the education system, or an equivalent document, and documented five-year professional practice, if such person performs only practical activities as an instructor.

2.4. Possibilities of professional development, recognition/validation of competence

In the PV trainer's profession there is a possibility to develop competences with the focus on: didactic activities in organized forms (lectures, exercises, training), both formal and non-formal, conducting classes within the company at workplaces, activities supporting students and listeners in the form of consultations and career counselling, providing consultations and advice to other trainers, lecturers and teachers on the methodology of conducting classes and substantive issues, planning, programming and evaluation of educational activities, organizing and managing the learning process, managing the educational institution, researching educational needs and defining competence gaps, participation in the work of expert teams creating teaching programs and didactic materials, participating in the work of examination commissions.

Depending on the adopted legal solutions, the PV trainer may be obliged to periodically renew professional qualifications: substantive, pedagogical and coaching, depending on the validity period of the trainer's certificate.

Having a combined professional and specialist vocational qualifications allows you to assign a diploma or certificate of a vocational education and training trainer to at least level 5 of the European Qualifications Framework.

Confirmation of qualifications or validation of PV competences can be based on the results of the committee proceedings established by the environment of organizations representing a specific industry, vocational education and the socio-economic environment. The basis for the validation and certification process may be solutions adopted in the National Qualifications System or other industry and environmental solutions, created, for example, based on ISO / IEC 17024: 2012. Conformity assessment – General criteria for the operation of various types of bodies that certify people.

2.5. List of professional competences / qualifications and units of learning outcomes

K1. Planning, organizing, conducting and evaluating of the vocational training (VET trainer)

- Planning and designing vocational training and other forms of improving professional competence of employees.
- Organisation and provision of teaching activities and consultation related to the training offer.
- Promotion and provision of the quality of training services and awarding the qualifications.

K2. Planning, installation, modernization and maintenance of photovoltaic installations (photovoltaic installation fitter)

- Planning installation of photovoltaic systems.
- Assembly of photovoltaic installations.
- Modernization and maintenance of photovoltaic installations.

2.6. Relations between professional competence and the level of skills in the EQF / NQF

Professional competence of the vocational education and training trainer in the construction sector meet requirements of the descriptors of level 5 of the European Qualifications Framework:

Knowledge

It has extensive knowledge within the scope of general construction, including specialist, factual and theoretical knowledge in the area of construction specialisation in which it conducts classes. It knows and understands the broad scope of theories and methods concerning programming, organising, conducting, assessing and evaluating training in the construction sector and it perceives dependents among them with regard to various considerations and contexts relevant for the construction and training sector.

Skills

It presents an extensive scope of cognitive and practical skills needed for a creative solution of theoretical and practical professional problems in the construction sector and in the specialisation in which it conducts training. It can perform educational tasks on its own in variable, predictable conditions, solve slightly complex and untypical problems concerning the organisation and conducting training courses in variable, predictable conditions, learn on its own, make statements understandable for recipients with use of a specialised terminology.

Competence

It is ready to perform functions related to management and supervision, both in contexts of career in the construction sector, as well as related to the organisation and performance of professional training subject to unpredictable changes. It can review and develop performance of itself and others. It is prepared to take up basic professional and social duties related to the organisation and performance of professional training. It can manage a small team in organised conditions, assess its own actions and actions of persons and teams it manages, as well as accept responsibility for results of these actions.

3. Description of the professional competence / qualifications

K1. Planning, organizing, conducting and evaluating of the vocational training	
K1.1. Planning and designing vocational training and other forms of improving professional competence of employees	
Knowledge (it knows and understands):	Skills (it can):
<ul style="list-style-type: none">– Directions and trends in the development of professional competences in the industry in which he conducts classes.– Documents describing competency requirements for employees in the industry in which they conduct classes.– Legal basis for the organization and implementation of training in the industry in which it conducts classes.– Fundamentals of andragogy – adult education.– Methods and tools of identifying the training needs of the employees.– Methodical fundamentals of the development of professional training program for the experts in a specific industry.– Principles and tools of diagnosing the competence of training candidates.– Methods and organizational forms of vocational training in a specific industry.– Principles and forms of cooperation with organisers of professional training in a specific industry.– Principles of validation of the vocational training program at the pre-implementation stage.– The rules and regulations of health and safety, fire protection, ergonomics and environmental protection in a specific professional sector and during conducting didactic activities.	<ul style="list-style-type: none">– Analysing of available reports on researches and projects concerning the development of qualifications and competence required in a specific industry.– Use of open resources concerning the knowledge of occupations, describing the qualification and competence requirements for the employees experts in a specific industry.– Adjustment of the curricular offer to the legal requirements.– Identification of training needs of individuals, enterprises, as well as local labour market.– Application of methods and development of tools to identify the training needs of the employees training in a specific industry.– Analysis of results of the educational needs research in the context of developing the curricular offer.– Development, in cooperation with training organiser and employers, of curricular offers for qualifying courses and professional skill courses.– Design of the professional training program with use of learning outcomes (knowledge, skills, competence).– Selection of a method of didactic work and organisational forms of classes relevant for a given training course.– Recognition of interests and expectations of training participants.– Assessment of the quality of a training offer with participation of external experts.– Definition of the principles and prerequisites of

	<ul style="list-style-type: none"> – participation in training and other classes. – Plan and development of the schedule of training and classes. – Identification of the resources required for designing and implementing a training program. – Diagnosis of the competence of candidates qualified for professional training. – Care about safe and hygienic conditions of the course of training and classes.
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Social competence

<ul style="list-style-type: none"> – Operates independently and cooperates in organised conditions during the training and classes designing. – Accepts responsibility for the quality of designed training and classes programs. – Assesses the impact of prepared educational projects on potential participants and their work environment. – Is able to critically assess its own actions as a designer and organiser of training and classes.
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K1.2. Organisation and provision of teaching activities and consultation related to the training offer

Knowledge (it knows and understands):	Skills (it can):
<ul style="list-style-type: none"> – Cognitive and emotional processes in the teaching and learning process. – Group process in the course of classes. – Methodology of teaching adults. – Elements of evaluation of the learning process. – Activating and practical methods, techniques and forms of didactic work. – Principles of communication during classes. – Creative problem solving in the teaching and learning process. – Methods of dealing with a difficult training participant. – Fundamentals of the knowledge of professions. – Fundamentals of mentoring and career counselling. – Principles of providing the class participants with feedback. – Principles of developing substantial and methodical materials, as well as didactic means. – Principles of cooperation of the teaching staff during the training performance. – Basic legal regulations concerning the course of exams, issuance of certificates and diplomas. – Psychological aspects of didactic assessment. – Principles and methods of didactic measurement. – Principles, procedures, methods and criteria of assessing and examining the professional training participants. – Quantitative and qualitative analysis of the examination results. – Methods of presenting the examination results. 	<ul style="list-style-type: none"> – Organisation of appropriate house, didactic and material conditions, adequate for the needs and requirements of the training and classes participants. – Selection of activating and practical training methods and techniques adequate for the participants' needs. – Selection of didactic means adequate for a purpose and perceptive capability of participants. – Analysis of the needs of a group of participants in order to adjust a training program. – Development of training materials for participants. – Preparation and performance of presentation within the scope of held general and specialist professional knowledge. – Service of didactic means necessary for conducting lectures and exercises. – Preparation of an exercise stand providing with optimal teaching and learning conditions. – Carry out the exercises with methods tailored to the goal, participants' capabilities and equipment capabilities, complying with health and safety regulations and fire protection. – Provision of an appropriate level of involvement of people participating in classes. – Communication with a group of class participants in accordance with the interpersonal communication rules. – Present information in a clear and understandable way, use language adequate to the participant group's level. – Implement agreed educational purposes in the specific timeframe. – Apply in practice the learning principles as appropriate to age groups of participants (youth or adults).

<ul style="list-style-type: none"> – Principles of keeping the training process documentation. – The rules and regulations of health and safety, fire protection, ergonomics and environmental protection in the industry in which it conducts vocational training. 	<ul style="list-style-type: none"> – Assess and examine training participants. – Apply assessment criteria and methods of verifying learning outcomes. – Prepare sets of theoretical and practical exam tasks. – Provide participants with current feedback concerning learning outcomes. – Collect and analyse feedback from training participants concerning the quality and efficiency of classes. – Manage the group process at every stage of development of a training group. – Ensure integration of a participant group to an extent necessary to accomplish didactic purposes. – Respond flexibly to the participants' needs, changing methods of conducting classes. – Solve conflict situations without detriment to the group and the didactic process. – Apply methods of mentoring and career guidance in individual classes. – Establish content-related and methodical cooperation with other lecturers and trainers. – Use open educational resources and distance teaching methods in training for the industry in which it conducts professional training. – Keep the training documentation according to the adopted principles.
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Social competence

<ul style="list-style-type: none"> – Takes responsibility for the effects of made decisions and conducted classes. – Adjusts its behaviour to variable circumstances of work during classes. – Assesses the impact of its classes on the development of learners' knowledge and skills. – Promotes the models of proper behaviour in the learning and working environment. – Helps plan the career paths and choose appropriate professional activity.

K1.3. Promotion and provision of the quality of training services and awarding the qualifications

Knowledge (it knows and understands):	Skills (it can):
<ul style="list-style-type: none"> – Basic legal regulations concerning awarding qualifications in the in the industry in which he conducts classes. – Advantages and disadvantages of the model of validation and certification of professional competence based on the ISO/IEC 17024:2012 standard. – Procedures and criteria of quality assurance concerning the training. – Methods of validating the effects of non-formal learning through work experience. – Procedures, methods and criteria of validation and certification of competence. – Methods and tools of internal evaluation of a training process. – Validation principles of the professional training program. – Validation methods of informal learning outcomes through work experience. – Principles of quality assurance of the teaching and learning process. 	<ul style="list-style-type: none"> – Documentation of evidence confirming the training participant's competence. – Participation in works of boards of examiners, validation boards and qualification awarding boards in the construction sector, chairing the board works if applicable. – Planning and designing the training evaluation. – Organisation of the evaluation process. – Provision of the class evaluation. – Evaluation of one's own teaching work. – Monitoring of educational progress of the training participants. – Application of the quality assurance rules concerning the training and classes. – Use of evaluation conclusions for the improvement of one's work and planning of one's development. – Use of evaluation conclusions to improve quality of the teaching and training programs. – Adjustments of identified irregularities related to the teaching and learning process and training performance.

<ul style="list-style-type: none"> – Promotion and dissemination of professional training in the non-formal education and working environment 	<ul style="list-style-type: none"> – Promotion and dissemination of professional training in the non-formal education and working environment. – Dissemination of the model of validation and certification of professional competence in the construction sector. – Improvement of one’s own professional competence through the organised forms of non-formal education and self-learning.
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Social competence

<ul style="list-style-type: none"> – Independently and in organised conditions assesses educational progress of the training participants in accordance with clear and objective criteria. – Assesses and examines while keeping its internal belief in justice and objectivity of made decisions. – Takes responsibility for effects of actions in which it participates, including the choice of forms and program of professional improvement, teaching methods, results of monitoring and evaluation of training and other educational activities. – Constructively responds to changes in legal regulations, requirements of training participants, commissioners, employers and work environment in the construction sector. – Voluntarily improves the vocational education and training trainer’s skills and tools.
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K2. Planning, installation, modernization and maintenance of photovoltaic installations

K2.1. Planning installation of photovoltaic systems

Knowledge (it knows and understands):	Skills (it can):
<ul style="list-style-type: none"> – History and prospects of photovoltaic development in Europe and in the world. – Economic, environmental and social benefits of photovoltaic applications. – National regulations and standards for the use and use of photovoltaics. – Regulations regarding health and safety at work, fire protection and the environment used during installation – identification of hazards. – Examples of product certification systems (eg Solar Keymark). – Basic terms and definitions for photovoltaic systems. – Basic knowledge of low voltage electrical installations and photovoltaic installations (General electrical engineering related to photovoltaic installations). – Project records (documentation). – Solar cell - construction and principles of operation. – Types of photovoltaic cells and modules. – Types of photovoltaic systems. – Equipment and components of photovoltaic systems. – Selection of technical solutions. – Energy profiles of receivers. – Dimensioning the system. – Connecting the photovoltaic system to the power grid. – Standards and technical specifications related to the thematic group. – Current-voltage characteristics of modules. 	<ul style="list-style-type: none"> – Using project documentation and technical materials (operating instructions, DTR, etc.). – Linking cells into modules and modules into sets. – Measurement of cell / solar module parameters under standard conditions (STC). – Choosing the type and power of photovoltaic modules, configuring the solar generator. – Determining the required cross-section of connection cables. – Defining the requirements for lightning protection, grounding (earth) and system (installation) of surge suppression. – Calculation of the system surface and the nominal size of the system, necessary subsystems and devices and the appropriate equipment. – Select inverter / inverter as an energy converter; inverter / inverter safety functions; determining the efficiency of the inverter / inverter. – Adjusting the generator to the inverter / inverter – Evaluation of the system operation - analysis of quality indicators.

<ul style="list-style-type: none"> – Factors affecting work efficiency. – Cooperation of photovoltaic installation with alternative sources of electricity. 	
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Social competence

<ul style="list-style-type: none"> – Be responsible during the work preformation. – Demonstrate a good professional doing. – Propose alternatives with the objective to improve results. – Maintain the work area with the degree of order and cleanliness required by the organization. – Participate and collaborate actively in the work team. – Interpret and execute working instructions.

K2.2. Assembly of photovoltaic installations

Knowledge (it knows and understands):	Skills (it can):
<ul style="list-style-type: none"> – Health and safety regulations for the installation. – Installation plan. – Tools and equipment for installation of photovoltaic systems. – Practical principles of module installation, selection and dimensioning of wires and cables. – Rules for configuring and running photovoltaic systems. – Cooperation of batteries with photovoltaic systems. – Surge protection in photovoltaic installations. – Lightning protection and earthing installation. – Installation rules for photovoltaic systems. – Typical assembly installation errors. – Collection conditions and technical documentation of the installation. – Estimate, offer, contract for the installation of photovoltaic devices and systems. 	<ul style="list-style-type: none"> – Applies health and safety rules at the installation and is able to pass them on to participants of the training. – Performs the installation plan. – Uses tools and equipment for assembly. – Evaluates the quality of materials used and works performed. – Installs modules, selects wires and cables in accordance with the design documentation. – Configures and runs photovoltaic systems. – Selection and installation of surge voltage surge arresters in photovoltaic installations. – Selection and assembly of lightning protection and grounding elements. – Installation of photovoltaic systems. – Detection and analysis of typical installation assembly errors. – Development of as-built documentation of a photovoltaic installation. – Performs measurements and measurements of works related to the assembly of photovoltaic devices and systems. – Prepares cost estimates and prepares offers and agreements regarding the installation of photovoltaic devices and systems.

Social competence

<ul style="list-style-type: none"> – Finish the work according to criteria of suitability, speed, economy and efficiency. – Recognize the productive process of the organization. – Comply with the production standards set by the organization. – Maintain the work area with the degree of order and cleanliness required by the organization. – Participate and collaborate actively in the work team. – Interpret and execute working instructions.
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K2.3. Modernization and maintenance of photovoltaic installations

Knowledge (it knows and understands):	Skills (it can):
<ul style="list-style-type: none"> – Health and safety at work regulations, environmental protection. – Health protection during modernization works and maintenance of photovoltaic installations. – Safety rules for the maintenance and maintenance of a photovoltaic installation. 	<ul style="list-style-type: none"> – Applies health and safety at work, environmental protection, health protection during modernization and maintenance of photovoltaic installations. – Performs measurements of current-voltage characteristics of photovoltaic modules / generators.

<ul style="list-style-type: none"> – Photovoltaic maintenance program. – Monitoring of photovoltaic system properties – guidelines and measurement requirements and their analysis. – Analysis of typical errors related to modernization and maintenance. – Types of typical disturbances and failures in systems. – Methods and repairs or replacement of photovoltaic components. – Records of inspection, maintenance and repair of photovoltaic installations. – Estimate, offer, contract for works related to the modernization and maintenance of photovoltaic installations. 	<ul style="list-style-type: none"> – Performs measurements of the PV generator's efficiency. – Performs and analyses the results of thermographic tests of photovoltaic installations. – Performs periodic evaluation of the photovoltaic plant operation. – Performs periodic photovoltaic plant maintenance. – Diagnoses and repairs damaged components of photovoltaic installations. – Evaluates the quality of modernization, maintenance and repairs carried out on photovoltaic installations. – Keeping documentation of inspection, maintenance and repair of photovoltaic installations. – Settles the costs of works related to the modernization and maintenance of photovoltaic installations.
Social competence	
<ul style="list-style-type: none"> – Demonstrate some autonomy in the resolution of small contingencies related to their activity. – Recognize the productive process of the organization. – Comply with the production standards set by the organization. – Maintain the work area with the degree of order and cleanliness required by the organization. – Interpret and execute working instructions. – Respect the internal procedures and standards of the organization. 	

In the preparation of the description of the standard of competence / qualifications of the PV trainer, the following studies were used:

- Polish standards of professional competences for professions: Lecturer at courses (educator, trainer) (235910); Training specialist (242403). Material provided by the project partner: Institute for Sustainable Technologies – National Research Institute in Radom from Poland.
- Description of the trainer's functions in terms of knowledge, skills and competences in order to conduct training at level 5 EQF – Romanian Standard of Qualification No. 241205/2007. Material provided by the project partner: Galati University from Romania.
- National professional qualification standard: "Teaching of training for employment" (Spanish code: SSC448_3). Material provided by the project partner: Fundación Equipo Humano (Spain).
- National professional qualification standard: "Assembly and maintenance of solar photovoltaic systems" (Spanish code: ENA261_2). Material provided by the project partner: Fundación Equipo Humano (Spain).

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- 2) Alphabetic index of professions and professional specialties of the classification of 2014 – according to the condition as of 22 December 2014, <http://psz.praca.gov.pl/rynek-pracy/bazy-danych/klasyfikacja-zawodow-i-specjalnosci>
- 3) Classification of professions and specializations, <http://psz.praca.gov.pl/rynek-pracy/bazy-danych/klasyfikacja-zawodow-i-specjalnosci/wyszukiwarka-opisow-zawodow>
- 4) Commission Recommendation of 29 October 2009 on the use of the International Standard Classification of Occupations (ISCO-08) (Journal of Laws L 292, 10/11/2009 P. 0031-0047).

- 5) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77 / EC and 2003/30 / EC(Dz. U. L 140/16 of 5.6.2009) In particular: Appendix IV: Certification of installers.
- 6) Directive of the European Parliament and Council No. 2009/28 / EC from 23 April 2009, on the promotion of the use of energy from renewable sources, amending and subsequently repealing Directives 2001/77 / EC and 2003/30 / EC(Dz. U. L 140/16 of 5.6.2009) In particular: Appendix IV: Certification of installers.
- 7) EU directive 28/2009/CE – about "promoting the use of energy from renewable sources by Article 14, which stipulates that by the end of 2012, Member States shall ensure certification schemes or equivalent qualification for installers in renewable energy sector (small boilers and stoves and biomass systems solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps). Also, each Member State shall recognize certification awarded by other member states in accordance with criteria established by the Directive.
- 8) Exploring leadership in vocational education and training, CEDEFOP, Publications Office of the European Union, Luxemburg 2011.
- 9) Government Decision no. 129/2000 about professional education for adult people.
- 10) Government Decision no. 556/2011 about organization and functioning of the ANC (National Authority for Qualifications).
- 11) Gruza M., Hordyjewicz T.: Klasyfikacja zawodów i specjalności na potrzeby rynku pracy. Tworzenie i stosowanie. [Classification of Professions and Professional Specialties for the Needs of Labour Market. Development and Application] Ministry of Labour and Social Policy, 2014.
- 12) <http://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=CELEX:32009L0028&from=PL>, 20.09.2016.
- 13) http://www.educacion.es/educa/incual/pdf/BDC/ENA261_2.pdf
- 14) <http://www.pifs.org.pl/strona/nasza-izba.html>
- 15) <http://www.wszechnica.uj.pl/>
- 16) Jak się wyszkolić, by szkolić innych. Wprowadzenie w problematykę zawodu trenera. Polska Agencja Rozwoju Przedsiębiorczości, Warszawa 2009.
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- 18) Modular program of the vocational training for the occupations: Teacher/Instructor (235102); Lecturer on courses (235910); Teacher/Instructor of practical job training (311105)– (Ministry of Economy, Labour and Social Policy – Department of the Labour Market, Warsaw, December 2003).
- 19) National professional competence standard: “Renewable energy systems installer” (712902).
- 20) National professional qualification standard: “Assembly and maintenance of solar photovoltaic systems” (Spanish code: ENA261_2)
- 21) National professional qualification standard: “Teaching of training for employment” (Spanish code: SSC448_3)
- 22) National professional skill standard: “Training Expert” (242403).
- 23) National Qualification Authority – NQA, (called ANC in Romanian), <http://www.anc.edu.ro/>
- 24) OG 29/2010 which stipulates – Annex Conditions for certification schemes relating to installers (including PV installers).
- 25) Order of the Minister of Labour and the Minister of Education no. 1062/3989 of 1 March 2011 for updating the qualifications classification and the programs that can be organized for certifications.
- 26) Principles of organising a pedagogical course for the instructors of practical job training (Regulation of the Minister of National Education of 15 December 2010 concerning the practical job training, Journal of Laws No. 244, item 1626).

- 27) Professional qualification standard for the occupation “Lecturer on courses (educator, trainer 235910)”.
- 28) Regulation of the Minister of Economy of 25 March 2014. On the conditions and procedures for issuing certificates and accredit training providers in the field of renewable energy sources, OJ 2014 item. 505 (repealed by the Act of 20 February 2015. Renewable energy OJ 2015 No. 0 pos. 478 2016.11.05);
- 29) Regulation of the Minister of Labour and Social Policy of 7 August 2014 concerning the classification of professions and professional specialties for the needs of labour market, Journal of Laws 2014, item 1145.
- 30) Regulation of the Minister of Labour and Social Policy of 7 August 2014. On the classification of professions and specialties for the needs of the labour market and its scope (OJ 2014 pos. 1145).
- 31) Regulation of the Minister of National Education of 11 January 2012. On lifelong learning in school (OJ 2012 No. 0 pos. 186, as amended);
- 32) Regulation of the Minister of National Education of 15 December 2010. On apprenticeship (Dz. U. No 244, item. 1626);
- 33) Regulation of the Minister of National Education of 7 February 2012 concerning the core curriculum of vocational education (Journal of Laws No. 62, item 439).
- 34) Regulation of the Ministry of Economy of 25 March 2014 on the conditions and procedures for issuing certificates and accreditation of training providers in the field of renewable energy sources (Dz. U. 2014 No. 0 pos. 505).
- 35) Regulation of the Ministry of Economy of 25 March 2014 on the conditions and procedures for issuing certificates and accreditation of training providers in the field of renewable energy sources
- 36) The Act of 20 February 2015. Renewable energy sources (DZ.U. 2015 No. 0 pos. 478) In particular: Chapter 7: The conditions and procedures for issuing certificates to installers of microinstallations, small installations and installation of renewable energy sources with a total installed capacity of heat not greater than 600 kW, and accreditation of training providers
- 37) The Law on Higher Education of July 27, 2015 year (Journal of Laws of 2005 No. 164, item. 1365, as amended);
- 38) The NCO standard list of occupations can be found at the address:
http://www.mmuncii.ro/j33/images/Documente/Munca/COR/2015-03-26_ISCO_08_COR_lista_alfabetica.pdf
- 39) The Polish Standard PN-HD 60364-7-712 Low voltage electrical installations. Part 7-712: Requirements for special installations or locations of photovoltaic (PV) power supply systems.
- 40) The qualifications list for that can be organized training programmes finished with a Professional Qualification Certificated approved by Ministry of Labour, Social Solidarity and Family and the Ministry of Education, Research and Youth no. 35/3112/2004.
- 41) The Spanish Order PRE/1615/2015, July 23rd on the updating of professional qualifications of the Energy and Water professional family as defined in the National Catalogue of Professional Qualifications.
- 42) The Spanish Organic Law 5/2002 June 19th, on Qualifications and Vocational Education and Training.
- 43) The Spanish Royal Decree 1538/2006, December 15th, establishing the General Organisation of Vocational Training in the Education System.
- 44) The Spanish Royal Decree 229/2008, February 15th, on the regulation of VET National Reference Centres.
- 45) The Spanish Royal Decree 34/2008 January 18th and 1675/2010 December 10th. Ministry of Employment and Social Affairs, regulating Vocational Training for Employment.
- 46) The Spanish Royal Decree 395/2007 March 23rd, Ministry of Employment and Social Affairs, regulating Vocational Training for Employment Subsystem.
- 47) The Spanish Royal Decrees 1128/2003, September 5th and 1416/05, November 19th, Ministry of Employment and Social Affairs, regulating the National Catalogue of Professional Qualifications.

Partner Contacts

The organisations contributing to the development of PV Trainer are listed below. Please feel able to contact them for more information and support.

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