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PV TRAINER

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MODULAR TRAINING PROGRAMME FOR THE PHOTOVOLTAIC TRAINER WITH REGARD TO ECVET EQUIREMENTS

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MODULAR TRAINING PROGRAMME FOR THE PHOTOVOLTAIC TRAINER WITH REGARD TO ECVET REQUIREMENTS

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INTRODUCTION

The study presents the modular training programme for the PV trainer, which was developed in the Erasmus+ project ***"Training and certification model for photovoltaic trainers with the use of ECVET system (EU-PV-Trainer)"*** with use of the MES (Modules of Employable Skills) methodology, developed by the International Labour Organisation and modified for the project purposes. Within the framework of consultations in the partnership, there were introduced simplifications to the MES methodology, consisting in the modification of documentation with consideration of the best practice identified in the partner countries.

The modular training programme was developed based on the analysis of employers' requirements included in the description of the standard of professional competence for the PV trainer. Proposals of changes submitted by participants of training organised under the project in four partner countries were also taken into account.

By connecting the modular training programme with the standard of professional competence of the PV trainer, the modular programme has taken into account guidelines of the EQF (European Qualification Framework), NQF (National Qualification Framework, ECVET (European Credit System for Vocational Education and Training), in particular:

- reference to the EQF/NQF qualification levels as tools allowing to understand and compare qualifications granted in various countries and various education and training systems,
- consideration of the language of learning outcomes in the standard provisions, i.e. presentation of professional qualifications included in the standard through the prism of components such as knowledge, skills, and social competences,
- translation of the standard provisions as a competence description into the category of learning units together with associated points,
- consideration of trainees' self-assessment of professional competences acquired during training.

As a result of works conducted under the partnership:

- professional competences distinguished under the professional competence standard were assigned to the modules,
- occupational tasks distinguished under the competences in the professional competence standard of the PV trainer were assigned to the modular units,
- components of occupational tasks, i.e. knowledge, skills and social competences, were grouped and assigned to subjects of particular training units.

Two modules were distinguished under the modular programme for the PV trainer:

1) **M1. Planning, organizing, conducting and evaluating of the vocational training** – a vocational education and training specific for the trainer, i.e. taking into account the pedagogical and methodological aspects of conducting classes, andrology (working with adults), organization, implementation and evaluation and quality assurance of training;
2) **M2. Planning, installation, modernization and maintenance of photovoltaic installations** – a PV installation specific for a fitter.

In every module, three modular units each were distinguished with equivalents of occupational tasks performed at work.

Training units constituting subjects of particular courses were distinguished in modular units.

The program's modular structure consists of:

- program and organisational assumptions of training,
- curricula,
- vocational training modules, modular and training units.

The organisational assumptions present general methodological recommendations concerning training execution, exercises, applied educational methods and methods of verification and assessment of trainees' achievements.

With use of an educational map, the scheme of correlations between particular modular units was presented and the sequence of their performance was defined. Application of such an approach enables the trainee, in its education according to the MES modular programme, to undergo subsequent modular units, acquiring knowledge and skills necessary for the performance of professional tasks distinguished in the PV trainer's competence standard.

Under the programme, every modular unit was assigned with detailed learning outcomes, subjects of courses (training units).

The modular units distinguished in the programme were assigned with sets of learning outcomes composed of knowledge, skills and competences. At the stage of formation of the professional competence standard and the modular training programme for the PV trainer, it was made sure that learning outcomes constituting the qualification were:

- described in clear and understandable categories through the reference to knowledge, skills and competences constituting them;
- constructed and organised in the way consistent with the given competence;
- constructed in the way allowing for individual assessment and validation of learning outcomes included in the given unit.

Under the project, it was assumed that the curriculum should provide the qualification level compliant with the European Qualification Framework (EQF) and the National Qualification Framework (NQF), together with associated ECVET points.

While giving the ECVET points under the project, the Recommendation of the European Parliament and of the Council on the establishment of a European Credit System for Vocational Education and Training (ECVET) was applied. According thereto, points constitute a supplementary numerical source of information on qualifications and units. They do not have any value in isolation from acquired learning outcomes concerning the specific qualification to which they refer, but they reflect the fact of acquisition and accumulation of learning outcomes.

Assuming that learning outcomes acquired during one year of formal vocational education and training on a full-time basis corresponds with 60 ECVET points, which translates into approx. 900 teaching hours in the teaching process of vocational education, it was assumed for the project purposes that one point referred to approx. 15 teaching hours.

While assigning the ECVET points, it was recommended to ensure assignment in two stages:

1) firstly, assignment goes to the specific qualification as a whole,
2) then, to particular modular units.

In order to ensure comparability of qualifications in the professional competence standard and in the modular training programme of the PV trainer, the European Qualification Framework (EQF) level was indicated.

The modular training programme for the PV trainer proposed in the partnership contains the minimum requirements within the scope of knowledge, skills and personal and social competences that it should have. It is compliant with the definition of QUALIFICATION assumed for the project purposes as a set of learning outcomes within the scope of knowledge, skills and social competences acquired in formal education, non-formal education or through informal learning, compliant with the requirements established for the given qualification, the accomplishment of which was verified in validation and formally confirmed by the eligible certification body.

A developed structure of the modular training programme is flexible. Modules and modular units may be updated (modified, supplemented or replaced) according to the changing needs of the labour market, technological progress and development of science, and adjusted to the trainees' level.

Implementation of a learning process based on the modular programme is described with the following features:

- teaching and learning process is oriented towards the achievement of specific, measurable learning outcomes in the form of knowledge, skills and social competences allowing for the performance of specific professional tasks assigned to the PV trainer,
- organisation of the learning process allows for the recognition of learning outcomes acquired by the training participant in the formal, non-formal and informal (e.g. in working environment, through one's own learning) education,
- learning process is supported by the application of activating teaching methods that trigger activity, creativity, student's self-assessment ability.

Under the project, the assumption was adopted that educational packages, in particular, support education in full-time mode, while for distance teaching purposes the training platform was developed. Therefore, when the participant, after the e-learning training completion, does not have fully acquired skills related to conducting courses or to assembling the PV installation, it is recommended to complete additional full-time training within this scope. It is also recommended that such training takes place in accredited training units within the given scope.

It is also allowed to confirm (with a separate certificate) modular units completed successfully unless a candidate finishes the entire course for ill-fated reasons. It shall enable to supplement the whole set of requirements included in the programme some other time selected by the participant or in the course of other training, without the necessity of repassing modular units confirmed with an independent certificate.

Glossary

Below you can find a list of concepts and terms used in the development of modular professional training programme based on the so-called Modules of Employable Skills (MES).

Modular programme of a professional training	Documentation of professional training defining learning outcomes (learning), the scope and arrangement of teaching and learning, methods and teaching aids (including materials for the implementation of activities). The selection of modular training programme`s content is based on the analysis of professional tasks occurring in the profession, which correspond to the modular units in the training programme.
Modules of Employable Skills – MES	Scope of work corresponding to the professional competence separated in the standard of professional competence for particular profession, expressed in the form of modular units. It is a separate part of the modular training programme consisting of a set of learning outcomes associated with a given professional competence. The learning outcomes are being detailed the modular units, leading learners to achieve learning outcomes in the form of knowledge, skills and personal and social competences.
Modular Unit	A logical and acceptable part of work within the profession with clearly defined beginning and end, corresponding to a specific professional task. Its result is a product, service or important decision. The professional task requires from an employee to influence the following elements: tools, equipment, other people, information, data, events, conditions, environment, etc. A modular unit of a training programme is a separate section of the training programme, described as a professional task, the performance of which the learner has to master. It is a coherent and independent/separate didactic unit (an element of the module of professional training), which has precisely formulated, measurable and detailed learning outcomes and the corresponding teaching material together with a set of exercises that allows the development of skills and personal and social competences.
Teaching map of modular vocational training programme	It is a graphical block diagram showing the correlations that exist between the modules and modular units separated in the professional training programme. A correlation system of modules and modular units enables the optimal organization of training classes and division into groups.
Progress Check	It is an accurate reflection of the learning outcomes set for the modular unit (and the training unit). It has to provide a reliable evidence that the learner is able to demonstrate the learning outcomes achieved, learned according to the standards and conditions set out in the description of the objectives. The progress check is to be performed at the end of the training unit as a self-assessment by a learner.
Learning Package	A set of materials for teaching and learning constituting the didactic materials for the training programme and referring to the modular unit. It consists of among others: a learner`s guide and a teacher's guide, sets of exercises and teaching materials, as well as a set of tools for checking the progress and achievements of the learning outcomes.

CURRICULAR AND ORGANIZATIONAL ASSUMPTIONS OF A TRAINING

1. Description of the occupation/qualification – selected elements

1.1. Position of a profession (competences) in classifications

Modul 1. Planning, organizing, conducting and evaluating of the vocational training

International Standard Classification of Occupations (ISCO-08)

- group 2424 Training and staff development professionals

European Qualifications Framework

- level 5 (minimum)

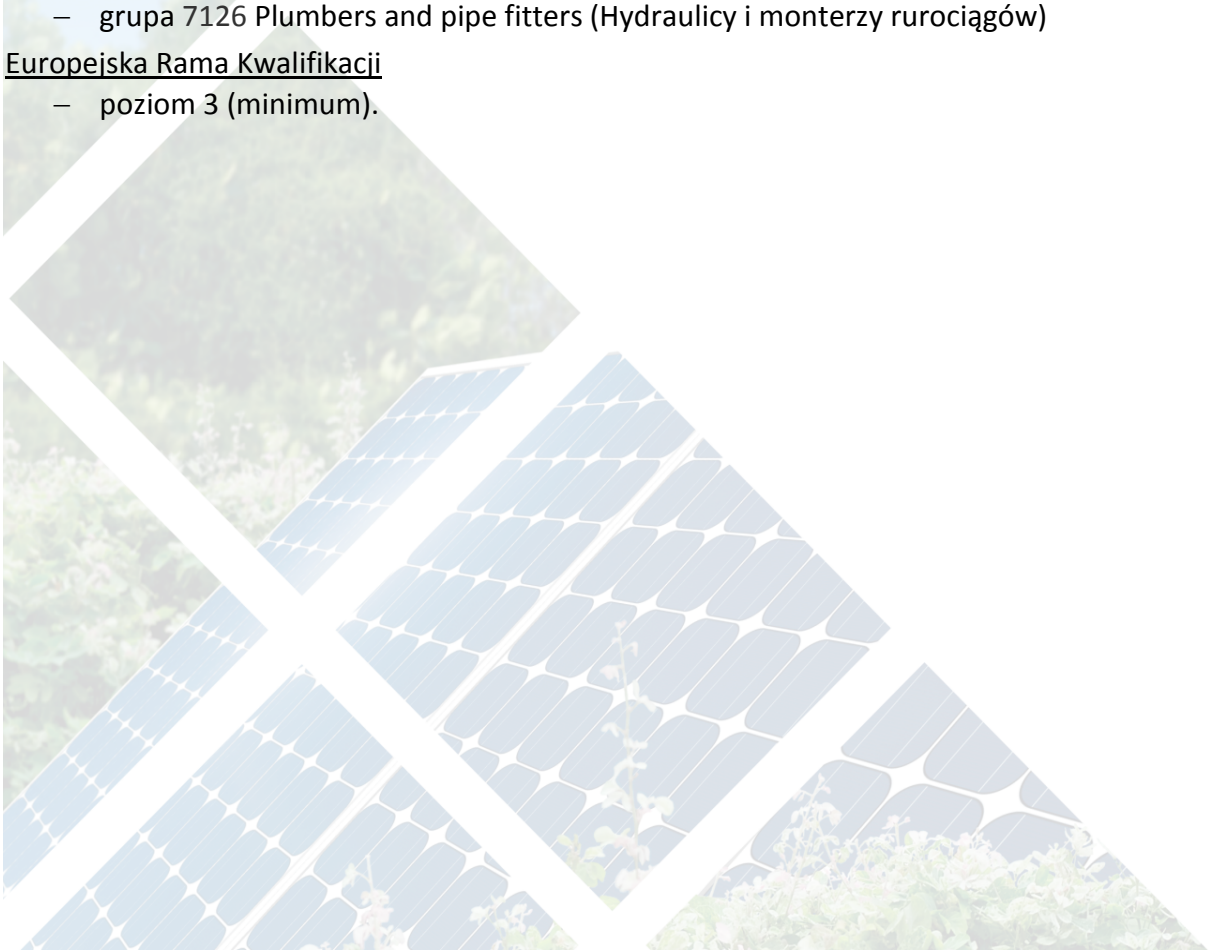
Modul 2. Planning, installation, modernization and maintenance of photovoltaic installations

Międzynarodowy Standard Klasyfikacji Zawodów ISCO-08

- grupa 7126 Plumbers and pipe fitters (Hydraulicy i monterzy rurociągów)

Europejska Rama Kwalifikacji

- poziom 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).

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.

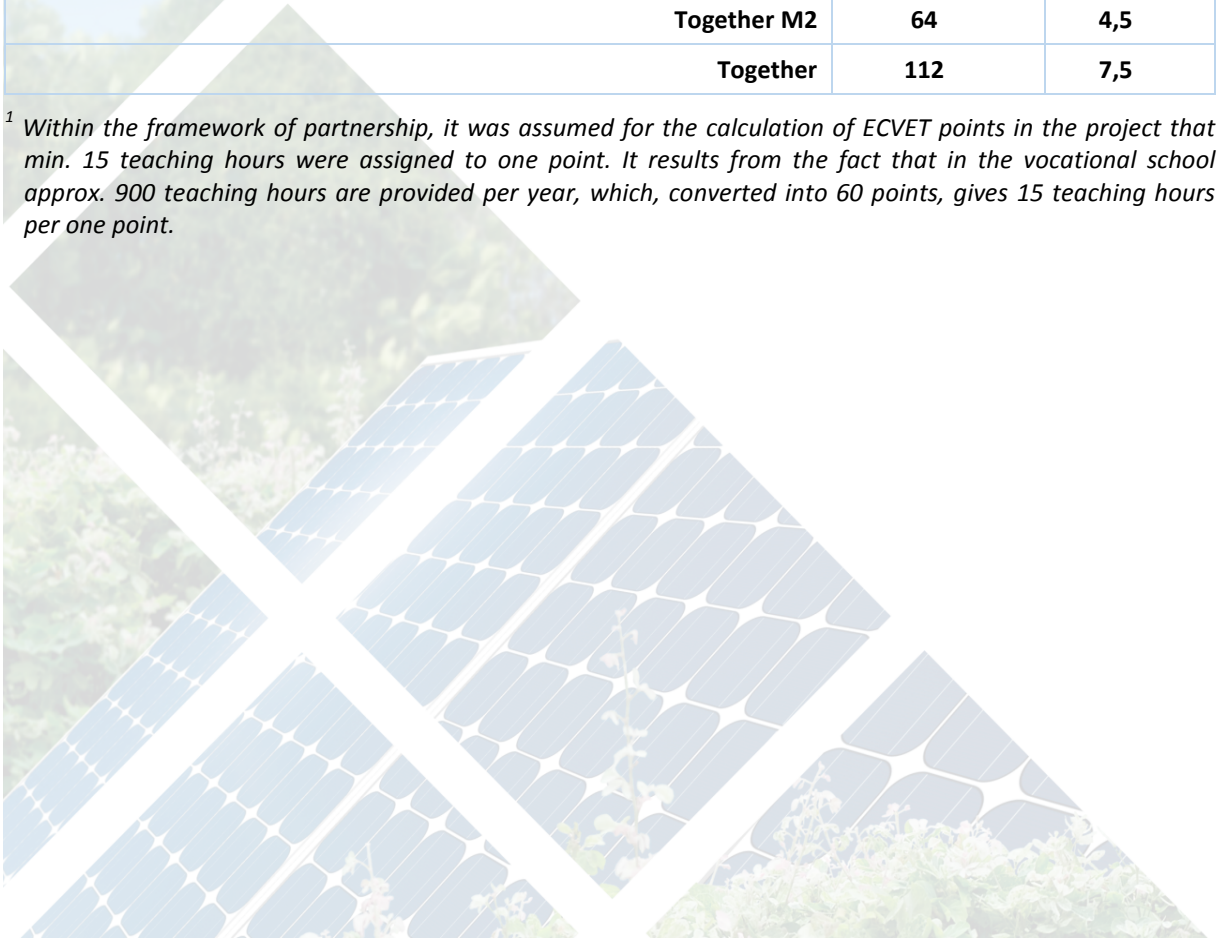
Having a combined professional and specialist vocational qualifications allows you to assign a diploma or certificate of a vocational education and training trainer to at least level 5 of the European Qualifications Framework.

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*.

3. Training schedule

Modul	Modular units	Approximate number of hours per implementation	Number of points ECVET[1]
M1. Planning, organisation, execution and assessment of professional training	M1.U1. Planning and designing vocational training and other forms of improving professional competence of employees	18	1
	M1.U2. Organisation and provision of teaching activities and consultation related to the training offer	18	1
	M1.U3. Promotion and provision of the quality of training services and awarding the qualifications	12	1
	Together M1	**48**	**3**
M2. Planning, installation, modernization and maintenance of photovoltaic installations	M2.U1. Planning installation of photovoltaic systems	28	2
	M2.U2. Assembly of photovoltaic installations	20	1,5
	M2.U3. Modernization and maintenance of photovoltaic installations	16	1
	Together M2	**64**	**4,5**
	Together	**112**	**7,5**

[1] *Within the framework of partnership, it was assumed for the calculation of ECVET points in the project that min. 15 teaching hours were assigned to one point. It results from the fact that in the vocational school approx. 900 teaching hours are provided per year, which, converted into 60 points, gives 15 teaching hours per one point.*



4. Requirements concerning the teaching and learning proces organisation

Implementation of the training programme should be compliant with an attached proposal (scheme below) of the "Educational map of the vocational training' modular programme". It is a system of connections between modules and modular units of the programme that specifies an order of their implementation. It shall be applied by training organisers to plan courses and by trainees to plan their learning process.

Training may be provided:

1) on a full-time basis in a training institution, conducted by the trainer, with application of a set of educational packages developed under the project and supported with a set of tests developed in an electronic version and available on a training platform together with e-learning training;
2) remotely when the trainee logs in the training platform and learns on its own.

The trainer, while completing the training programme, should have a background in the area of methodology of modular education, activating teaching methods, didactic measurement and design and development of educational packages, as well as should have a specialist background within the scope of planning, assembly, modernisation and maintenance of photovoltaic system installations.

The trainer, while leading the skill acquisition process of the participant, should help it with solving issues related to the task performance, control the pace of acquisition of professional skills, with consideration of personal qualifications and experience.

The trainer, in justified cases, may establish an individual education programme. Moreover, it should develop its interest in profession, indicate possibilities of further education, acquisition of new professional skills. It should also form desired attitudes of participants, such as reliability and responsibility for work, care for its quality, keeping work area clean, respect for other people's work, care for reasonable use of materials.

The trainer should participate in organisation of the technical and educational basis and in the evaluation of curricula, in particular in the period of dynamic changes in methods and technologies applied in photovoltaics. It is recommended for the trainer to update and supplement educational packages supporting the curriculum implementation.

During classes, the trainee should also be able to form its personal and social competences foreseen in the given curriculum. It is enabled i.a. by prepared exercises. If it is about the full-time training, the trainer performs a very important role, as it must create such didactic situations in which it is possible to form personal and social competences distinguished in the programme.

It is recommended that full-time courses are conducted in max. 16-person groups. Practical exercises should be organised in 2-4-person groups.

Recommended teaching methods

It is recommended that modular education is conducted with activating methods, such as the guiding text method, guided self-learning method, case study method and method of projects and practical exercises. Practical exercises shall constitute the dominant method. It

is recommended to use educational films, organise educational trips to sites of executed investments and specific tasks, to warehouses, stores selling materials and tools, to photovoltaic fairs, exhibitions of materials and equipment. During the programme implementation, self-education should be emphasised, with use of materials other than handbooks, such as standards, instructions, guides and extratextual information sources. While implementing the content of education, including exercises, modern technologies, materials, tools and equipment should be considered.

Proposals of exercises

It is recommended that exercises in the guide for the trainer and for the trainee are possible for performance in the full-time and remote training.

In the case of full-time training, it is recommended that trainers extend exercises and practical aspects related to conducting courses or to planning, assembling and operating PV installations.

Assessment of trainees' achievements

Before, during and after every modular unit, the trainee should be able to conduct the assessment of acquired knowledge and skills, which should make it aware of a level of its achievements against the requirements specified in the professional competence standard, introduce it to regular work, self-control and self-assessment. Assessment of trainees' achievements should be conducted with use of tests (oral, written and practical), observation of trainee's operations, didactic measurement. Verification and assessment of achievements requires from the trainer the determination of criteria and norms of assessment, development of performance tests, observation sheets and progress evaluation sheets.

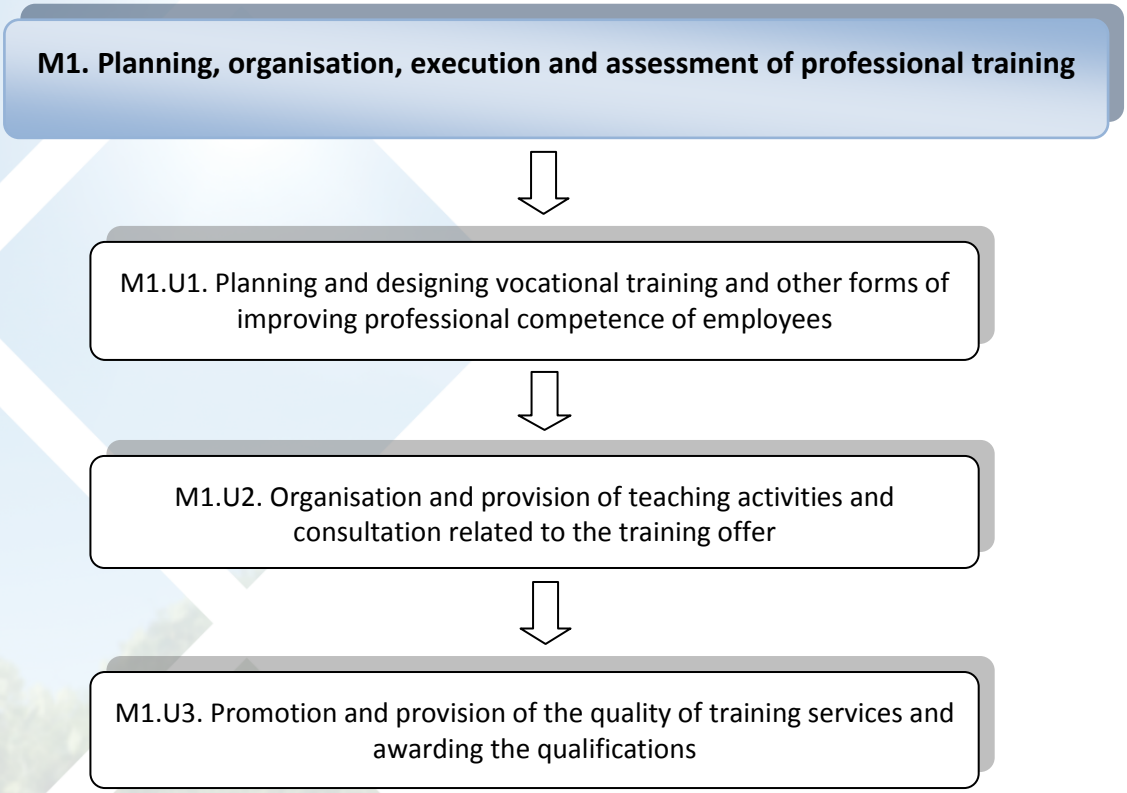
It is recommended that, prior to the commencement of full-time and remote training and of every modular unit, diagnostic assessment is conducted to recognise the scope and level of knowledge and skills of the learner in the initial phase of its education. It is recommended to apply a skill test for this purpose, to be filled by the learner. If the learner obtains more than 80% of correct answers from such a test, it may be released from the given scope of training.

During full-time and remote training, after every modular unit it is recommended to conduct a formative assessment, which aims at the provision of valid information on the efficiency of teaching and learning processes. Information acquired as a result of assessment enables to make necessary adjustments in the teaching and learning process. Under the project, progress tests after every training unit were prepared to enable the trainee conduct self-assessment of acquired learning outcomes.

After the formative assessment (self-assessment test of acquisition of knowledge and skills after every modular unit), the trainee should commence the summative assessment of a modular unit and entire training. Test sets developed under the project shall be applied for this purpose. Tests are available for the trainee in an electronic version on the developed training platform. Tests were developed under the test bank. In the test, software selects random questions from the test database for every modular unit. The full-time or remote training participant must obtain more than 80% of correct answers to score the given modular unit. Completion of all modular units under the training programme results in the issuance of a certificate confirming successful training completion.

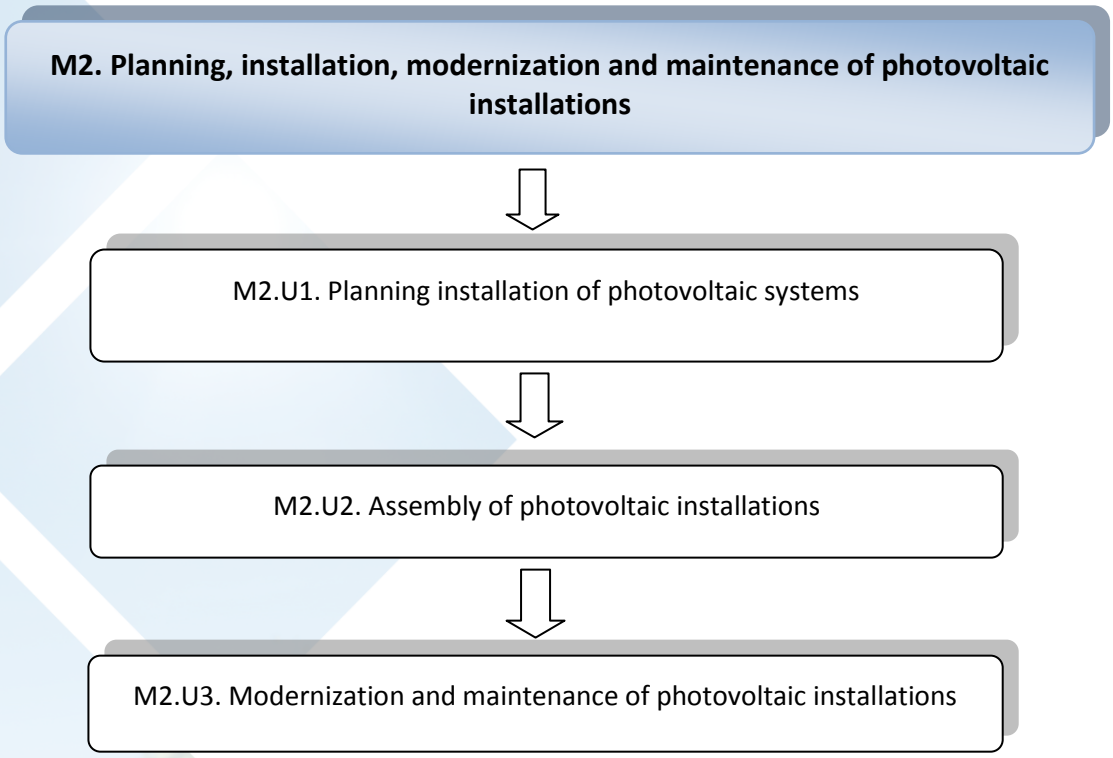
5. Didactic map of vocational training programme

The following scheme presents a correlation of modular units in the module M1. Planning, organisation, execution and assessment of professional training.



Before a participant moves to go through the modular unit M1.U2 should already have finalized the modular unit M1.U1. Then the participant implements a training content for modular unit M1.U3. An execution order presented in the scheme is recommended.

The following scheme presents a correlation of modular units in the module M2. Planning, installation, modernization and maintenance of photovoltaic installations.



Before a participant moves to go through the modular unit M2.U2 should already have finalized the modular unit M2.U1. Then the participant implements a training content for modular unit M2.U3. An execution order presented in the scheme is recommended.

MODULAR TRAINING PROGRAM FOR PV TRAINER – MODULAR AND TRAINING UNITS

1. M1.U1. Planning and designing vocational training and other forms of improving professional competence of employees

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– 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.	– 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	– M1.U1.S1. What competence requirements must be met by the renewable energy source industry trainer? – M1.U1.S2. How can employees' training needs be identified in enterprises? – M1.U1.S3. How to develop a training offer in cooperation with the training organiser and employers and what should be covered by the training curriculum? – M1.U1.S4. What organisational forms of classes and methods of the didactic work with adults are recommended to be applied? – M1.U1.S5. How interests, expectations and competences of training participants can be identified? – M1.U1.S6. Who can participate in the assessment of training curriculum and materials prior to the training commencement? – M1.U1.S7. To what dangers may training participants be exposed?

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– The rules and regulations of health and safety, fire protection, ergonomics and environmental protection in a specific professional sector and during conducting didactic activities.	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 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.	
Social competence: – 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.		

2. M1.U2. Organisation and provision of teaching activities and consultation related to the training offer

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– 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	– 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	– M1.U2.S1. What is the specificity of conducting training with adults? – M1.U2.S2. How to prepare a training room and select didactic aids to conduct classes? – M1.U2.S3. How to prepare teaching materials for the training participants? – M1.U2.S4. How to prepare presentation for the training purposes? – M1.U2.S5. How can the trainee integration be conducted? – M1.U2.S6. What roles can be performed by the trainer during the training? – M1.U2.S7. What roles can be performed by the trainee in the group? – M1.U2.S8. What phases can distinguish in the group process? – M1.U2.S9. What difficult situations may happen during the training and how to handle them? – M1.U2.S10. How to effectively communicate with trainees? – M1.U2.S11. How to assess and examine training participants? – M1.U2.S12. What and how to document during training?

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
assessing and examining the professional training participants. – Quantitative and qualitative analysis of the examination results. – Methods of presenting the examination results. – 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.	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). – 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	

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
	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.	
Social competence: – 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.		

3. M1.U3. Promotion and provision of the quality of training services and awarding the qualifications

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– 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. – Promotion and dissemination of professional training in the non-formal education and working environment	– 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. – 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	– M1.U3.S1. What is validation and certification? – M1.U3.S2. Can the standard ISO/IEC 17024:2012 be applied in the processes of validation and certification of professional competences? – M1.U3.S3. How training evaluation should be conducted and improved? – M1.U3.S4. How can the trainer conduct promotion and dissemination of professional training in non-formal education and in working environment?

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
	through the organised forms of non-formal education and self-learning.	
Social competence: – 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.		

4. M2.U1. Planning installation of photovoltaic systems

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– 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.	– 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.	– M2.U1.S1. General issues. Basis for the use of photovoltaic systems – M2.U1.S2. Photovoltaic cell – structure and operating principle – M2.U1.S3. Types of photovoltaic cells and modules – M2.U1.S4. Types of photovoltaic systems – M2.U1.S5. Elements and devices of photovoltaic installation – M2.U1.S6. Selection of technical solutions – M2.U1.S7. Energy profile of consumers – M2.U1.S8. PV system sizing – M2.U1.S9. PV system – connection to the grid – M2.U1.S10. Standards and technical specifications connected with a thematic group – M2.U1.S11. Factors affecting work productivity – M2.U1.S12. Cooperation of the photovoltaic installation with alternative energy sources

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– Current-voltage characteristics of modules. – Factors affecting work efficiency. – Cooperation of photovoltaic installation with alternative sources of electricity.		
Social competence: – 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.		

5. M2.U2. Assembly of photovoltaic installations

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– 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.	– 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.	– M2.U2.S1. Health and safety regulations for the installation – M2.U2.S2. Installation plan – M2.U2.S3. Tools and equipment for installation of photovoltaic systems – M2.U2.S4. Practical principles of module installation, selection and dimensioning of wires and cables – M2.U2.S5. Setting up and start-up of photovoltaic system – M2.U2.S6. Cooperation of batteries with photovoltaic systems – M2.U2.S7. Power surge protection in photovoltaic installations – M2.U2.S8. Lightning protection and earthing installation – M2.U2.S9. Installation rules for solar systems – M2.U2.S10. Typical assembly installation errors – M2.U2.S11. Collection conditions and technical documentation of the installation – M2.U2.S12. Estimate, offer, contract for the installation of solar devices and systems
Social competence: – 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.		

6. M2.U3. Modernization and maintenance of photovoltaic installations

Educational (learning) outcomes		Training units
Knowledge (it knows and understands):	**Skills (it can):**	
– 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. – 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.	– 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. – 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.	– M2.U3.S1. Health and safety at work regulations, environmental protection – M2.U3.S2. Health protection during modernization works and maintenance of photovoltaic installations – M2.U3.S3. Safety rules for the maintenance and conservation of the solar installation – M2.U3.S4. Photovoltaic maintenance program – M2.U3.S5. Monitoring of photovoltaic system properties – guidelines and measurement requirements and their analysis – M2.U3.S6. Analysis of typical errors related to modernization and maintenance – M2.U3.S7. Types of typical disturbances and failures in systems – M2.U3.S8. Methods and repairs or replacement of photovoltaic components – M2.U3.S9. Records of inspection, maintenance and repair of solar installations
Social competence: – 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.		