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ECVET system for no borders in the Green Economy sector

supporting Employability, Adaptability and European Mobility in VET systems and Labour Market

DESK ANALYSIS - RO
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ECoVET
ECVET SYSTEM FOR NO BORDERS IN THE GREEN ECONOMY SECTOR, SUPPORTING EMPLOYABILITY, ADAPTABILITY AND EUROPEAN MOBILITY IN VET SYSTEMS AND LABOUR MARKET

Guidelines and Research Tool Kit – DESK ANALYSIS - Part I

REFERENCE FRAMEWORK

TheECoVETproject proposes the application and development of the ECVET system in the green economysector. Specifically, since this is a "Transfer of Innovation" (TOI) project, the goal of the project is to use the methodology and tools developed within the project NETWORK - previously funded by the European Commission under the Lifelong Learning Programme, Leonardo da Vinci sub-program, Call EACEA/14/08 "Projects to test and develop the credit system for vocational education and training (ECVET)" - in order to adaptand transfer them into a different sectoral contexts of experimentation and in order to support the transparency and sharing at European level of the peculiarities of a professional profile working in the field of the green economy: the TECHNICIANFOR THE DESIGN AND DEVELOPMENT OF ENERGY-SAVING SYSTEMS

The project,therefore,intends:

- to compare the qualifications of the identified sector existing in the partner countries, focusing our attention on the equivalent Regionalprofile;
- to identify parts of the educational pathways and qualifications which are "ECVET-compatible" and therefore able to dialogue with each other;
- to identify processes and protocols of understanding suitable to facilitate the mutual recognition
- to propose to competent bodies (key actors of VET systems and related systems of transparency and certification of qualifications), and in particular in Tuscany with whom the national partnership have shared the ECoVET planning phase, any changes and / or implementations to be taken on the basis of European experiences .

This for the benefit of the commissioning transparency of competences and qualifications and above all of employability in a the European labour market, in the specific sector and in the contexts identified.

From this emerges the primary importance, especially in the phase of setting up and organising the work among the partners, of acquiring a common reference framework, through the collection, organisation and sharing of indispensable background information.

From this information must begin the construction and application of common instruments for the definition, actuation, validation and recognition of modular training paths, already existing in the partner countries, within the ECVET system (including among these also the processes of support, validation and recognition of Life Long Learning and Life Wide Learning training experiences) with the double purpose of facilitating mobility in the various training phases and situations and of allowing the “accumulation” of tendentially recognisable credits, to improve employability and mobility, in the entire Community.

On an operational level, the partners are called upon to describe and select professional profiles using indicators and charts pre-defined by the partnership in order to represent a context framework from which to begin, in the first place to make a comparison of the existing profiles and certification methods and later, to identify the characterising elements indispensable to homogenise the representations.

This first phase of the research will involve a double methodology:

1. **DESK RESEARCH**, which calls for the analysis of the national repertories of professional profiles(for example REGIONALVET Systems, repertoires of learning units, any existing systems for the validation of Learning from Experience, etc.) in the green economy sector, specifically as much as possible related to the characteristics of the selected Regional profile, in each partner country, with particular attention to vocational education and training systems
2. **FIELD RESEARCH**: which calls for field observations, with at least 5 interviews for each partner nation with operators in the green economysector and, specifically, in different types of related structures and productive units, and validated within the research desk. The field survey will be carried out through the use of search tools such as semi-structured interviews and check lists for the direct field observation, etc...

ECoVET DESK RISEARCH

The **field of application** of the desk research will concern **the green economy sector**in its different possible meanings, that will be shared by the project partners, and more specifically the professional profiles working as technicians for the design and elaboration of energy-saving systems within the different types of companies and enterprises of the sector.

The reference profiles involved in the research, would have to be identified:

- from the viewpoint of the ***professional characterisation***, in those who work in the area of the implementation of policies and regulations for the design and elaboration of energy-saving systems within the different types of companies and enterprises of the sector and for the different operational specifications related to them, or, more specifically, to the professional profiles that may correspond, for example, to the Regionalprofile TECHNICIANS FOR THE DESIGN AND ELABORATION OF ENERGY-SAVING SYSTEMS within the different types of companies and enterprises of the sector
- from the viewpoint of the **level OF competence**, in EQF level 5

Knowledge	Skills	Competences
factual and theoretical knowledge in broad contexts within a field of work or study	a range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities

- from the viewpoint of the ***correspondence to levels of institutional training***, in the technical-vocational training paths following the completion of secondary education [for example: Istruzione e formazionetecnicasuperiore (IT); Višjestrokovnešole (SI), etc..] or analogous situations.

Within the field of application described, the desk research will be articulated in :

A) AN ANALYSIS OF CONTRACT FORMS: collection and elaboration of documentation on **the regulatory and contract situation in vigour in the partnership countries**, through the comparative analysis of the collective labour contracts of the sector in the part describing the levels and the professional qualifications that are applicable to the functional area selected and to the professional profiles operating in the area being studied.

The purpose of the analysis is the gathering and ordering of elements to be used in constructing a common reference grid, in order to make it possible, on the one hand, to effectively compare the specific regulatory-contractual situations to which the professional profiles selected, and, on the other, to determine whether or not forms of integration between the labour market and the training

system are present. (The analysis should be between 3 and 7 pages in length, following the attached format) .

Analysis grid of the **REGULATORY AND CONTRACT SITUATION**	
Professional profile 1	**ROMANIA**

TEHNICIAN OPERATOR OF RENEWABLE POWER SYSTEM

EQF Level 5

Working framework (position, tasks, etc.)

- Skilled worker which can install and supervised electrical equipment and plant used in *wind or photovoltaic power stations*. He can work autonomous or under supervision.

Reference documentation: (eventually attach copies)

The training profile is the result of a ESF project lead by the National Centre for VET in Romania and it is not yet introduce in the *Register of Vocational Qualifications* HG Nr. 866/ 2008 amending *H G nr. 844/2002* ANNEX 3.

Eventual mention/references in the labour contracts of forms of integration with the vocational training credit recognition systems

-not the case

Brief description of the activities distinguished by context (localisation)and type of workplace, and by levels of application (auxiliary, assistant, managerial etc.)

- to operate, maintain and repair such electrical plant and equipment, in compliance with the health and safety and fire fighting laws and regulations, assuming the responsibilities and roles in the team, developing his/her workplace decision making and problem solving capacity, and building attitudes such as correctness, respect, self-confidence and job satisfaction.

Analysis grid on the
REGULATORY AND CONTRACTUAL SITUATION

Professional profile 2

ROMANIA
Partner Country

(official denomination)

Fitter of electrical operation systems for renewable power sources
EQF level 4

Working framework (position, tasks, etc.)

Skilled worker which is competent to fit plant and equipment for the conversion of renewable power sources (sun and wind) into electricity. He can take up responsibility and roles in the team, developing his/her decision making and problem solving skills at the workplace.

Reference documentation: (attach copies)

The training profile is the result of a ESF project lead by the National Centre for VET in Romania and it is not yet introduce in the *Register of Vocational Qualifications* HG Nr. 866/ 2008 amending *H G nr. 844/2002* ANNEX 3.

Eventual mention/references in the labour contracts of forms of integration with the vocational training credit recognition systems

not the case

Brief description of the activities distinguished by context (localisation)and type of workplace, and by levels of application (auxiliary, assistant, managerial etc.)

- to maintain the renewable power sources (sun, wind, geothermal, water, biomass, waves, biogas) and fix defects that may occur in their operation, in compliance with the health and safety rules and regulations, fire prevention and fighting.

Duplicate to add any other charts

B)With respect to the professional profiles identified in the start-up phase of the project, and shared by the partners during the first transnational meeting in Siena, here it is requested to project partners to explain and detail in terms of knowledge, skills and competences the collection and analysis of the professional profiles extracted from the**national repertories** afferent to the activity area identified by the project(professional profiles working as technicians for the design and development of energy-saving systems within the different types of companies and enterprises), in order to create an initial comparative mapping of the competence frameworks represented in function both of the production of the ***"Descriptive Charts of the Professional Profiles***" and of a subsequent process of "construction /extraction" of common training *Units*.

The analysis of the repertories will keep in mind the close relation these have with the description of the training paths leading to them and, therefore, it would be useful to set up – independently from anydiverging evaluations of their more or less certifiable "scientific" congruity - using reference describers that cannot be other than those indicated in the EQF in terms of:

- knowledge - K (knowledge: the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practises that is related to a field of study or work. In the European Qualifications Framework, knowledge is described as theoretical and/or factual);
- Skills - S (skills:means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the European Qualifications Framework, skills are described as cognitive (use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments));
- Competence – C (competence: the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and/or

personal development. In the European Qualifications Framework, competence is described in terms of responsibility and autonomy).

To this end the partners are expected to:

1. construct a synthesis of the professional profile(s) represented for the individual areas of activity indicated in the project, through the use of “macro-describers” (not more than 10/12 per profile) corresponding roughly to the Learning Units/Modules/subject areas, etc… of the corresponding standard training paths.
2. make a “translation” of the ways of presenting these repertories through their articulation in terms of K/S/C. In this phase, a descriptive analytical quality is to be preferredto great “precision” in the distinction between K, S, and C.
3. present the eventually related documentation(repertories etc.) attaching this to the chart.

To this end we propose a chart and a general example, which could be helpful for a generic orientation.

PROFESSIONAL PROFILE ANALYSIS CHART FOR (**Indicate the official denomination**) **:**

Partner country: ROMANIA	**Repertory: TEHNICIAN OPERATOR OF RENEWABLE POWER SYSTEM**

Areas of activity (Macro- competences) that can be recognised

1. Using automation systems in processes.
2. Constructing electrical drive systems.
3. Production planning.
4. Operating photovoltaic power systems
5. Operating wind power systems

1. Area of activity (Macro- competence) 1 : Using automation systems in processes.

KNOWLEDGE	SKILLS	COMPETENCE
1.1.1. Automation systems: - applications, - types of processes, - types of automation. **1.1.2.** Automatic control system (ACS): - Components: regulator, actuator, transducer (classification, functional role, operating principle), - System measurable variables; - Information flow (direct, reverse) - Monitoring the variation of controlled variables (outputs, electrical and non-electrical).	**1.2.1.** Selecting the type of automation depending on the application and process **1.2.2.** Selecting the ACS components depending on the process: - Automated regulator, - Actuator, - Transducer. **1.2.3.** Interpreting the variations of the controlled variables in the information flow. ***1.2.4.*** *Monitoring automated parameters.*	***1.3.1.*** *Assuming a team role and team working.* ***1.3.2.*** *Proactive performance of a given work task.* ***1.3.3.*** *Complying with process flows and deadlines.* ***1.3.4.*** *Efficient use of working time.* ***1.3.5.*** *Proactive solving of a work task* **1.3.5.** Responsibility for the quality of work.

1.1.3. Automated control systems of process parameter (components, use): - Temperature control, - Flow control, - Speed/rotation control, - Pressure control, - Fluid level control. **1.1.4.** Sources of information and learning for automated control systems and components. **1.1.5.** PLC's: - structure - elements of programming language - use **1.1.6.** Educational software for PLC's **1.1.7.** Sources of information and learning for PLC's	**1.2.5.** Using automated control systems of process parameter: - Temperature, - Flow, - Speed/rotation, - Pressure, - Fluid level.. ***1.2.6.*** *Learning about automated regulation and components, including in a foreign language.* **1.2.7.** Using PLC's in automated systems ***1.2.8.*** *Using educational software* ***1.2.9.*** *Learning about PLC's* ***1.2.10.*** *Correct use of specialist language in workplace communication.* ***1.2.11.*** *Communicating the outcomes of work performed.*	**1.3.6.** Supporting decisions taken in the work performed. **1.3.7.** Complying with workplace procedures.
2. **Area of activity (Macro- competence) 2 :** Constructing electrical drive systems.		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
2.1.1. Electrical drive systems: structure **2.1.2.** Electrical devices in drive systems – automated switchgear, electromagnetic relays, signalling devices:	**2.2.1.** Representation of de electrical drive systems. **2.2.2.** Selecting electrical devices for building a drive depending on the rated parameters, , construction etc.	***2.3.1.*** *Assuming a team role and team working.* ***2.3.2.*** Responsibility for the quality of work;

- classification, - rated parameters, - construction, - operation, - usage **2.1.3.** Electrical drive motors: - classification, - rated parameters,, - construction, - operating principle, - (electro) mechanical characteristics, - selection criteria for use in drive systems, - heat and electrical stress. **2.1.4.** Catalogues of electrical parts made in Romania or abroad (electrical apparatuses, electrical motors, wires and conductors) **2.1.5.** Documents for electrical drive systems: - Drawings of electrical drive systems with AC and DC motors (start-up, rev control, breaking), - Electrical installation drawings, - Connection drawings,	**2.2.3.** Analysing the (electro)mechanical characteristics of the drive system rotation variation at constant torque **2.2.4.** Determining the characteristics of the drive motor for a given machine **2.2.5.** *Determining the rated parameters of the drive motor depending on the machine* **2.2.6.** Selecting the electrical motor for building a drive system for a machine depending on given criteria. **2.2.7.** *Heat and electrical checks on the drive motor*. **2.2.8.** *Reading electrical parts catalogues, including in a foreign language.* **2.2.9.** *Reading electrical drive drawings.* **2.2.10.** Producing electrical installation drawings for a given electrical drive blueprint **2.2.11.** *Assessing the technical and operational characteristics of the components of a drive system in reference to the specs in the electrical parts catalogue.*	**2.3.3.** Supporting decisions made on work performed. **2.3.4.** Ownership of individual work plan. **2.3.5.** Efficient use of working time. **2.3.6.** Quality assurance of work performed. **2.3.7.** *Complying with process flows and deadlines.* **2.3.8.** *Complying with H&S standards.* **2.3.9.** *Proactive performance of a given work task.*

- Cable list, - List of equipment. **2.1.6.** Drive system building technology in accordance with the documentation: - Fitting components of drive systems, - Wiring components of the drive systems, - Materials, - TDV and measurement and control equipment, - H&S/operation. **2.1.7.** Procedures for checking the operation of electrical drive systems: - measurement and control equipment, - H&S.	**2.2.12.** *Producing the documentation for a drive system using IT&C.* **2.2.13.** Selecting TDV and measurement and control equipment. **2.2.14.** Installing the components of a drive system. **2.2.15.** Wiring the components of a drive system. **2.2.16.** Checking the operation of electrical drive systems using a measurement and control equipment. **2.2.17.** *Correct use of specialist language in workplace communication.* **2.2.18.** *Waste collection to minimise environmental impact.* **2.2.19.** *Recovery and use of electrical materials.*	

3. **Area of activity (Macro- competence) 3 :** Production planning.

KNOWLEDGE	SKILLS	COMPETENCE
3.1.1. Production process: - production process characteristics; - classification of production processes; - components of the production process; - correlations between the components of the production processes.	**3.2.1.** Analysing a typical production process from the perspective of: - Process characteristics; - Manner of production; - Nature of activities; - Time scheduling. **3.2.2.** identifying the elements of a typical electrical production process. **3.2.3.** Correlating inputs/resources in a production process and manufacturing stages with outputs/expected outcomes. **3.2.4.** *Correct use of specialist language to describe the structure of a production process or production planning methods.*	***3.3.1.*** *Taking responsibility in selecting and planning a production process.* ***3.3.2.*** Critical thinking in determining the inputs to a production process and the process stages, in correlation with the required outputs. ***3.3.3.*** *Taking responsibility for the assigned work task.* ***3.3.4.*** Decision making in selecting a particular type of production in a given situation.
3.1.2. Types of production (features, strengths, weaknesses) - individual production; - series production; - mass production.	**3.2.5.** Identification of types of production in depending on the variety of products, production volume, specialisation of operations, layout of workstations and internal transportation methods. **3.2.6.** Assessing the strengths and weaknesses of various types of production for a given context.	***3.3.5.*** Creative problem solving in organising production. ***3.3.6.*** Using automation as a method for production organisation. ***3.3.7.*** *Taking responsibility for completing/using production planning, launching and monitoring documents.*
3.1.3. Methods for organising the main production: - in flow; - by homogenous groups of machines and plant; - manufacturing cells;	**3.2.7.** Comparison of production organisation methods. **3.2.8.** *Applying production organisation methods for a*	***3.3.8.*** *Proactive problem solving in organising production.*

- automated. **3.1.4.** Production planning/scheduling - scheduling, preparing, launching and monitoring production; - planning materials and personnel; - documents used in planning workplace activities (documents for production launch, production sheet, graphs, diagrams etc.). **3.1.5.** Productivity indicators **3.1.6.** Methods for increasing production efficiency	*given context.* **3.2.9.** Determining the stages of production planning and organisation. **3.2.10.** *Determining the required materials and personnel for a given context.* **3.2.11.** Drawing operations planning graphs. **3.2.12.** *Using dedicated software for production planning.* **3.2.13.** *Using and/or completing documents for planning, launching and monitoring production in a given context (materials orders, work orders by operation or part, bills of work; bills of materials; part or product sheet, product movement schedules, operations sheets, diagrams etc.) using IT&C.* **3.2.14.** *Calculating the work productivity indicators.* **3.2.15.** Assessing a production process based on the work productivity indicators in view of increasing production efficiency. **3.2.16.** Analysing the methods of increasing production efficiency and selecting the optimal solution. **3.2.17.** *Communicating the outcomes of work performed.*	***3.3.9.*** *Teamwork to launch and monitor production.* ***3.3.10.*** *Responsibility for the outcomes of the assessment of the production processes.* ***3.3.11.*** Applying solutions for increasing production efficiency. ***3.3.12.*** *Compliance with rules, assuming team roles and teamwork*

If necessary, add other charts→

4. **Area of activity (Macro- competence) 4.** Operating photovoltaic power systems		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
1.1.1. Global policies in renewable energy sources. **1.1.2.** Romania's policy in renewable energy sources **1.1.3.** Solar energy. - Solar constant; - Flux density at ground level; - Flux density on variable gradient areas; - Solar radiation measuring equipment; **1.1.4.** Solar panels - operating principle; - equivalent circuit diagrams; - parameters of the photovoltaic cell; - influences of illumination and temperature;	***4.2.1.*** *Reviewing global and national policies on non-polluting power sources* **4.2.2.** Using the national law opportunities for building solar power plants ***4.2.3.*** *Measuring solar radiation for deciding the location of solar power plants.* ***4.2.4.*** *Determining the parameters of a solar cell* **4.2.5.** Connecting solar components circuitry (series, parallel)	**4.3.1.** *Proactive problem solving* **4.3.2.** Identifying solutions for dealing with team problems; **4.3.3.** Complying with the working times as per the established work schedule;

1.1.5. Types of applications in solar power generation - Specific components - Design elements - Sources of information on the types of solar applications	**4.2.6.** *Using primary design elements for designing a solar power plant:* - *Distance between arrays,* - *Sizing the plant* - *Calculating currents and voltages* - *Determining the optimal system configuration depending on the application.*	**4.3.4.** *Taking responsibility for the work task assigned as part of the team.*
1.1.6. Requirements for the layout of solar plant - criteria for maximising solar power generation; - solar panel tilt and alignment;	**4.2.7.** *Learning about various types of photovoltaic applications*	**4.3.5.** *Compliance with process discipline*
4.1.7. Internal electrical network in solar plant:	**4.2.8.** Determining the optimal system configuration depending on the application and the location.	
4.1.8. Symbols used in continuous or alternative current diagrams of solar panel plant; - diagrams of AC and DC solar panel plant. - components of solar plant (cables, power conditioners, protection systems, invertors)	**4.2.9.** *Correct use of specialist language in workplace communication.* **4.2.10.** Reading / preparing circuitry schemes for solar cell plant	**4.3.6.** *Team working in view of carrying out the workplace tasks*
4.1.9. Fitting / installation / verification and alignment technologies for solar panels and solar generator protections: - TDV used, - materials, - measurement and control equipment - quality standards for work on solar plant.	**4.2.11.** *Applying specific standardisation systems* **4.2.12.** Selecting the components of solar plant. **4.2.13.** Applying specific internal work instructions for power generation; **4.2.14.** Coordinating installation work (solar panels, cabling, power conditioners, protections,	**4.3.7.** Complying with workplace procedures

4.1.10. Maintenance and checks in solar plants: - Required operations - materials, - TDV, - measurement and control equipment. **4.1.11.** Troubleshooting by specific measurements in solar plants. - Types , - Causes. **4.1.12.** Specific health and safety regulations.	invertors). **4.2.15.** Checking operating parameters. **4.2.16.** *Communicating / reporting outcomes of work performed* **4.2.17.** *Quality assurance of work performed.* **4.2.18.** Drafting the bill of materials for maintenance work **4.2.19.** Coordinating maintenance work in solar power plants. ***4.2.20.*** *Interpreting the readings of measurements of solar plant parameters.* **4.2.21.** Applying H&S regulations	**4.3.8.** Compliance with quality requirements for work performed; **4.3.9.** *Active communication in the team, irrespective of the ethnic background of members* **4.3.10.** Compliance with H&S and fire fighting standards

5. **Area of activity (Macro- competence) 5.** Operating wind power systems		
KNOWLEDGE	**SKILLS**	**COMPETENCE**

5.1.1. Assessing wind potential: - Assessing average power; - Selecting the location; - Reviewing layout plans, installed power, types of turbines, foundations etc. 5.1.2. Sources of information on wind farms 5.1.3. Wind power plant / farms: - Components; - Operation regimes. 5.1.4. Fitting / installation / verification processes for wind turbines and related electrical equipment: - Switchgear, - Protection and signalling devices, - Measurement equipment 5.1.5. Maintenance and checks on wind plant / farms: - Required operations,	**5.2.1.** Determining the optimal configuration of wind power conversion plant **5.2.2.** Applying field –specific standardisation systems **5.2.3.** *Finding information about wind plants from various sources* **5.2.4.** Selecting the components of a wind farm **5.2.5.** *Correct use of specialist language* **5.2.6.** Coordinating the installation of wind turbines **5.2.7.** Coordinating the installation of the generator and related electrical equipment **5.2.8.** Connecting wind farms to the SEN ***5.2.8.*** *Communicating the outcomes of work performed* **5.2.9.** Correct filling-in of technical records **5.2.10.** Applying troubleshooting procedures in wind power conversion plants **5.2.11.** Coordinating maintenance of wind turbines and equipment **5.2.12.** *Interpreting the readings if measurements on wind plant.* **5.2.13.** Applying the quality standards for work carried out; **5.2.14.** Applying H&S and fire fighting regulations	***5.3.1.*** *Proactive decision making;* **5.3.2.** using working time in compliance with the work schedule **5.3.3.** Keeping technical documentation, measurement equipment and toolkits in standard conditions; ***5.3.4.*** *Taking responsibility for the work task assigned as part of the team* **5.3.5.** Compliance with process discipline ***5.3.6.*** *Team working in view of carrying out the workplace tasks* ***5.3.7.*** *Proactive problem solving* **5.3.8.** Identifying solutions for dealing with team problems; **5.3.9.** Complying with working times as per the established work schedule; ***5.3.10.*** *Compliance with process discipline* **5.3.11.** Complying with workplace procedures **5.3.12.** Compliance with H&S and fire fighting standards

- Materials, - TDV, - measurement and control equipment 5.1.6. Troubleshooting by specific measurements in wind plants / farms. - Types, - Causes. 5.1.7. Specific H&S and fire fighting regulations.		

PROFESSIONAL PROFILE ANALYSIS CHART FOR (**Indicate the official denomination**) **:**	
Partner country: ROMANIA	**Repertory: Fitter of electrical operation systems for renewable power sources**

Areas of activity (Macro- competences) that can be recognised

1. Building mechanical components of electrical plant
2. Measuring electrical values in plant
3. Installing electrical wiring
4. Fitting, maintaining and repairing low voltage electrical equipment
5. Fitting and maintaining photovoltaic plant
6. Fitting and maintaining wind power plant

1. **Area of activity (Macro- competence) 1 :** Building mechanical components of electrical plant

KNOWLEDGE	SKILLS	COMPETENCE
1.1.1. Ergonomic requirements at the workplace. **1.1.2.** Materials required for making parts by fitters: - Physical-chemical properties, - Mechanical properties	**1.2.1.** Ergonnomical organisation of te workplace **1.2.2.** Selecting the materials required for making parts by fitter operations, depending on their respective physical	***1.3.1.*** *Teamwork to carry out tasks at the workplace.* ***1.3.2.*** *Taking responsibility for the task as part of the team at the workplace.*

- Technological properties, - Standard symbols, - Scope of usage. **1.1.3.** Drawing standards (sketches and scale drawings) for process specifications: **1.1.4.** General fitting operations (cleaning, straightening, setting out, cutting, bending, boring, punching out, threading, dismountable and fixed assemblies): - operations, - tools, devices, verifiers (TDV), - measuring devices, - H&S/operation. **1.1.5.** Workplace hazard warning means (warning signs). **1.1.6.** Environmental protection and waste management rules	chemical and technological properties. **1.2.3.** Understanding standard symbolsof materials used in making parts. **1.2.4.** Making drawings for simple parts, items, subassemblies. ***1.2.5.*** *Interpreting graphic representations in the process specifications.* **1.2.6.** Selecting the TDV's required for each fitting operation to be carried out. **1.2.7.** Supplying the materials required for each operation. **1.2.8.** Carrying out operations: - cleaning, - straightening, - setting out, - cutting, - bending, in compliance with the process requirements. **1.2.9.** Making dismountable and fixed assemblies in compliance with the process requirements. **1.2.10.** Interpreting workplace warnings. **1.2.11.** Waste management for environmental protection **1.2.12.** Materials recovery and reuse.	***1.3.3.*** *Using work and protective equipment specific to the workplace.* ***1.3.4.*** Compliance with H&S regulations. ***1.3.5.*** *Compliance with electrocution protection standards.* ***1.3.6.*** Compliance with workplace ergonomic standards. ***1.3.7.*** Compliance with workplace hazard warnings. ***1.3.8.*** *Compliance with the rules for environmental protection and selective collection of waste.* ***1.3.9.*** *Proactive problem solving.*

	1.2.13. *Correct use of specialist language in workplace communication* **1.2.14.** *Communicating the outcomes of work performed*	
2. **Area of activity (Macro- competence) 2 :** Measuring electrical values in plant		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
2.1.1. Electrical values in electrical plant (definitions, measurement units, mathematical relations) . **2.1.2.** Laws and theorems for measuring electrical values in circuits. **2.1.3.** Simple electrical circuits (principle electrical drawing, calculation relations in serial/parallel circuits, typical values, educational software): **2.1.4.** Analogical and digital electricity measurement devices for measuring electrical values in D.C. and A.C. circuits (constructive types, symbols used for marking,	**2.2.1**. Calculating the numeric value of electrical measurements using mathematical formulas. **2.2.2.** Transforming measurement units. **2.2.3.** Determining electrical values in circuits by applying electricity laws. **2.2.4.** Drawing the electrical diagram for the use of simple circuits. **2.2.5.** Determining the resistance /equivalent capacity of serial/parallel circuits **2.2.6.** Determining the typical values for voltage divider circuits. **2.2.7.** Using educational software for simple electrical circuits **2.2.8.** Decoding the symbols used to mark measuring devices. **2.2.9** Selecting measuring devices for each of the electrical values typical for an electric circuit.	2.3.1.Assuming a team role and team working. 2.3.2. Responsibility for the quality of work; 2.3.3 Supporting decisions made on work performed. 2.3.3. Ownership of individual work plan. 2.3.4. Efficient use of working time. 2.3.5. Quality assurance of work performed. 2.3.6. Complying with process flows and deadlines. 2.3.7. Complying with H&S standards. 2.3.8. Proactive performance of a given work task.

technical and metrological features, measuring scope, assembly drawings, educational software). **2.1.5.** Measurement errors: types, causes, mathematical relations **2.1.6.** Extending the measurement scope of analogical devices (devices, assembly drawings, calculation relations, educational software) - shunt - additional resistance - measurement transducers (current -CT, voltage-VT)	**2.2.10.** Making measuring assemblies. **2.2.11.** Measuring electrical values of an electrical circuit: – Measuring current intensity, – Measuring voltage, – Measuring resistance, – Measuring power, – Measuring energy. **2.2.12.** Using educational software to measure electrical values using analogical and digital devices **2.2.13.** Determining errors in the measurement and percentage calculation process. **2.2.14.** Mathematical processing of measured values. **2.2.15.** Calculating shunt value required for a given measurement. **2.2.16.** Drawing the assembly schematics for using the shunt. **2.2.17.** Measuring electrical current intensity using shunts. **2.2.18** Measuring electrical current intensity using CT. **2.2.19.** Calculating the additional resistance for a given measurement. **2.2.20.** Drawing the assembly schematics for using additional resistance. **2.2.21.** Measuring voltage using additional resistors. **2.2.22.** Measuring voltage using VT. **2.2.23.** Using educational software to measure electrical values using analogical devices with extended measuring scope	

	2.2.24. Correct use of specialist language in workplace communication. **2.2.25.** Communicating the outcomes of work performed	
3. **Area of activity (Macro- competence) 3. .** Installing electrical wiring		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
3.1.1. Specific materials for electricity (conductive, isolating materials): - Physical-chemical properties, - Mechanical properties - Technological properties, - Standard symbols, - Scope of usage.	**3.2.1.** Selecting specific materials for electrical work depending on their physical chemical, technological properties and scope of usage.	**3.3.1.** Complying with the standards for symbolising the components in electric circuits. **3.3.2.** Teamwork to carry out tasks at the workplace **3.3.3.** Taking responsibility for the task as part of the team at the workplace.
3.1.2. Preparation operations in electrical fitting (measuring, stripping, cleaning, pickling): - Operations, - Specific TDV's, - H&S/operation.	**3.2.2.** Selecting the TDV's required for each preparing operation to be carried out. **3.2.3.** Supplying the materials required for each job to be carried out. **3.2.4.** Carrying out preparation operations for making connexions: - Measuring conductors, - Stripping conductors - Cleaning conductors, - Pickling conductors.	**3.3.4.** Using work and protective equipment specific to the workplace **3.3.5.** Compliance with H&S regulations. 3.3.6. Compliance with electrocution protection standards. 3.3.7. Compliance with workplace ergonomic standards **3.3.8.** Compliance with workplace hazard warnings
3.1.3. Electric and electronic components in electrical circuits: sources, resistors, bobbins, capacitors, diodes, transistors:	**3.2.5.** Selecting electrical components for making electrical circuits. **3.2.6.** Selecting electronic components for making	**3.3.9.** Compliance with the rules for environmental protection and selective collection of waste

- Operating function, - Marking. **3.1.4.** Simple electronic blocks (electronic schematics, assembly drawing s): - Double wave and half wave rectifiers, - One stage amplifiers. **3.1.5.** Information sources for simple electronic components and blocks. **3.1.6.** Electrical conductors and cables, accessories for low voltage electrical wiring **3.1.7.** Simple electrical installation technology (in compliance with the technical standards sheets): - operations, - specific TDV's and measurement and control devices, - H&S/operation - Quality standards for electricity work. **3.1.8.** Methods and means for protection against electrocution: possible electrocution situations (types), prevention. **3.1.9.** Means for workplace hazard warning (warnings:	electronic circuits. **3.2.7.** Fitting/replacing electronic blocks. **3.2.8.** Using information sources on simple electronic components and blocks, including those in an international language. **3.2.9.** Selecting electrical conductors and cables depending on the circuit to be built. **3.2.10.** Using specific TDV's for connecting electrical and electronic components in circuits. **3.2.11.** Installing simple electrical wiring (as per technical specifications sheets). **3.2.12.** Checking the work performed using measurement and control devices, in compliance with the specific technologies. **3.2.13.** Compliance with specific H&S for each operation carried out. **3.2.14.** Applying electrocution protection rules for the individual and for work mates throughout the duration of the operations.	**3.3.10.** Proactive problem solving

sound, visual, written warnings, indicators, security colours) **3.1.10.** Environmental protection and waste management standards	**3.2.15.** Interpreting workplace warnings **3.2.16.** Waste management for environmental protection. **3.2.17.** Recovering and reusing materials. **3.2.18.** Correct use of specialist language in workplace communication **3.2.19.** Communicating the outcomes of work performed	

4. Area of activity (Macro- competence) 4. Fitting, maintaining and repairing low voltage electrical equipment		
KNOWLEDGE	**SKILLS**	**COMPETENCE**

4.1.1.Low voltage electrical machines and devices (electric transformer, rotating electrical machines, manual switching gear, fusible plugs, thermal cut-outs): - Conventional markings; - Functional role; - Constructive sub-assemblies; - Usages. **4.1.2.** Information sources for low voltage electrical machines and devices. **4.1.3.** Fitting and connecting l..v. electrical equipment, as per the process standards sheets: - Fitting and connecting operations - Materials, - TDV's, measurement and control devices, - H&S/operation.	***4.2.1.*** *Decoding conventional markings of electrical machines and devices from electrical plant.* **4.2.2.** *Using the information sources for low voltage electrical machines and devices, including in an international foreign language.* ***4.2.3.*** *Interpreting the requirements stated in process sheets.* **4.2.4.** Assembling manual switch gear. **4.2.5.** Selecting TDV's and control devices when carrying out fitting operations. **4.2.6.** Selecting the materials required for installing/fitting l..v. electrical machines and devices. **4.2.7.** Fitting low voltage electrical devices in installations, as per the process sheets. **4.2.8.** Making connections of low voltage electrical devices. **4.2.9.** Installing electrical machines in electrical plant, as per the process sheets. **4.2.10.** Connecting electrical machines. **4.2.11.** Interpreting workplace warnings. **4.2.12.** Applying measures for limiting the stress on l.v.	**4.1.1**.Low voltage electrical machines and devices (electric transformer, rotating electrical machines, manual switching gear, fusible plugs, thermal cut-outs): - Conventional markings; - Functional role; - Constructive sub-assemblies; - Usages. **4.1.7.** Information sources for low voltage electrical machines and devices. **4.1.8.** Fitting and connecting l..v. electrical equipment, as per the process standards sheets: - Fitting and connecting operations - Materials, - TDV's, measurement and control devices, - H&S/operation.

	electrical equipment.	
4.1.4. Stresses on l.v. electrical equipment and limiting methods/measures. **4.1.5.** Maintenance, repair and verification work on low voltage electrical devices (as per process sheets): - Assembling/disassembling low voltage electrical devices, - materials, - TDV's and measurement and control devices, - H&S/operation. **4.1.6.** Environmental protection and waste management standards.	***4.2.13.*** *Interpreting the requirements stated in process sheets.* **4.2.14.** Selecting the TDV's and measurement and control equipment for l.v. electrical devices maintenance and repair work. **4.2.15.** Selecting materials for maintenance and repair of l.v. electrical devices. **4.2.16.** Carrying out maintenance work on l.v electrical devices. **4.2.17.** Carrying out repair work on l.v electrical devices. **4.2.18.** Using work and protective equipment specific to the workplace. **4.2.19.** Checking the operation of low voltage electrical devices subject to maintenance and repair work. **4.2.20.** Waste management for environmental protection. **4.2.21.** Recovery and reuse of materials in fitting / maintenance / repair work of electrical equipment. ***4.2.22.*** *Correct use of specialised language.* ***4.2.23.*** *Communicating the outcomes of work performed.*	**4.1.9.** Stresses on l.v. electrical equipment and limiting methods/measures. **4.1.10.** Maintenance, repair and verification work on low voltage electrical devices (as per process sheets): - Assembling/disassembling low voltage electrical devices, - materials, - TDV's and measurement and control devices, - H&S/operation. **4.1.11.** Environmental protection and waste management standards.

5. **Area of activity (Macro- competence) 5.** Fitting and maintaining photovoltaic plant		
KNOWLEDGE	**SKILLS**	**COMPETENCE**

5.1.1. Photovoltaic cell - Principle of solar energy conversion into electricity. - Classification of cells by process. **5.1.2.** Photovoltaic cell Electrical schematics of photovoltaic plant - Symbols of components - Classification of photovoltaic applications. - electrical schematics of photovoltaic plant. **5.1.3.** Electrical components of photovoltaic plant: - electrical cables. - power conditioning equipment - photovoltaic panel protection systems: **5.1.4.** Information sources on photovoltaic plant. **5.1.5.** Installing photovoltaic plant (as per process documentation). - methods for inter-connecting photovoltaic elements - operations for fitting electrical components -TDV's and measuring and control devices - specific H&S and fire fighting standards - Quality standards for photovoltaic plant works.	**5.2.1.** *Correct use of specialist language* **5.2.2.** Analysing various types of photovoltaic cells **5.2.3.** *Decoding symbols used in photovoltaic plant schematics* **5.2.4.** Representing electrical schematics of photovoltaic plant **5.2.5.** *Applying standardisation systems specific to the field* **5.2.6.** Selecting the electrical components for a particular application **5.2.7.** Analysing protection systems for a photovoltaic plant **5.2.8.** *Using sources of information on photovoltaic plant, including in an international language.* **5.2.9.** *Using the process documentation for fitting electrical equipment.* **5.2.10.** Installing photovoltaic panels **5.2.11.** Installing electrical cables **5.2.12.** Fitting power conditioning equipment **5.2.13.** Fitting over-voltage protection systems **5.2.14.** Making electrical connections to the power gird **5.2.15.** Applying internal work instructions specific to power generation	**5.1.1.** Photovoltaic cell - Principle of solar energy conversion into electricity. - Classification of cells by process. **5.1.2.** Photovoltaic cell Electrical schematics of photovoltaic plant - Symbols of components - Classification of photovoltaic applications. - electrical schematics of photovoltaic plant. **5.1.3.** Electrical components of photovoltaic plant: - electrical cables. - power conditioning equipment - photovoltaic panel protection systems: **5.1.4.** Information sources on photovoltaic plant. **5.1.5.** Installing photovoltaic plant (as per process documentation). - methods for inter-connecting photovoltaic elements - operations for fitting electrical components -TDV's and measuring and control devices - specific H&S and fire fighting standards - Quality standards for photovoltaic plant works.

5.1.6. Types of maintenance work on photovoltaic plant (as per process sheets). - Required operations - Materials - TDV's, measuring and control devices - H&S and fire fighting standards/job **5.1.7.** Defects of photovoltaic plant. - Procedures for measuring electrical values. - Types of defects (causes, remedial work)	**5.2.16.***Interpreting the requirements stated in the process sheets* **5.2.17.** Selecting TDV's and materials for maintenance work on photovoltaic plant **5.2.18.** Carryingout maintenance work on components of photovoltaic plant **5.2.19.***Interpreting the measurements of electrical values in photovoltaic plant* **5.2.20.** Fixing simple defects in photovoltaic plant. **5.2.21.***Communicating the outcomes of work performed*	**5.1.6.** Types of maintenance work on photovoltaic plant (as per process sheets). - Required operations - Materials - TDV's, measuring and control devices - H&S and fire fighting standards/job **5.1.7.** Defects of photovoltaic plant. - Procedures for measuring electrical values. - Types of defects (causes, remedial work)

6. **Area of activity (Macro- competence) 6.** Fitting and maintaining wind power plant		
KNOWLEDGE	**SKILLS**	**COMPETENCE**

6.1.1. Components of wind power plant/farms: - Wind turbines: - Wind power generators: constructive and operating characteristics - Electrical equipment for fitting: cables, electrical switch boards, power conditioning equipment, protection systems, automation	**6.2.1.** Comparing various types of wind turbines. **6.2.2.** Analysing the characteristics of wind power generators **6.2.3.** Selecting electrical equipment for building a wind power plant **6.2.4.***Correct use of specialist language;*	**6.3.1.** *Proactive problem solving* **6.3.2.**Complying with the working times as per the established work schedule; **6.3.3.**Keeping technical documentation, measurement equipment and toolkits in standard conditions
6.1.2. Information sources for wind power plant.	**6.2.5.***Using information sources on wind power plant, including in a international foreign language.*	
6.1.3. Installing wind power plant / farms (as per process documentation): - Process operations for installing wind power plant components - TDV's, measuring and control devices used - materials - specific H&S and fire fighting standards - quality standards for specific wind power plant work.	**6.2.6.***Using the process documentation for installing electrical equipment.* **6.2.7.** Fitting wind generators. **6.2.8.**Wiring the electrical equipment of low power wind generators **6.2.9.**Connecting over-voltage protection systems **6.2.10.** Checking operating parameters. **6.2.11.***Communicating the outcomes of work performed.* **6.2.12.***Interpreting the requirements stated in process sheets.*	**6.3.4.** *Taking responsibility for the quality of work performed* **6.3.5.**Compliance with H&S and fire fighting standards **6.3.7.** *Team working in view of carrying out the workplace tasks*
6.1.4. Wind power plant maintenance and repair work (as per process sheets): - Required operations - materials - defects: mechanical, electrical - TDV's, measuring and control devices - Job specific H&S and fire fighting standards	**6.2.13.** Selecting TDV's and materials for wind power plant maintenance work **6.2.14.***Interpreting the readings of electrical values measurements in wind power plant* **6.2.15.** Carrying out maintenance work on wind power plant. **6.2.16.** fixing simple defects of wind power plant.	**6.3.8.**Compliance with quality requirements for work performed. **6.3.9.**Using work and protective equipment specific to the workplace

Example:

PROFESSIONAL PROFILE ANALYSIS OF: **Technical education and training for design and development of energy-saving systems**	
COUNTRY PARTNER: ITALY	Regional Repertory of professional profile of Tuscany region - IT

Areas of activity (Macro- competences) that can be recognised

This profile is able to:

1. Monitor activities of the existing structures;
2. Processenergysavingsplans
3. Design energy-savingsystems
4. Evaluate energy saving plan of public or private organizations

Area of activity (Macro- competence) 1: Monitoring activitiesof the existing structures		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
- Basics of plant design to ensure professionalism in the monitoring of the plants - Energy policies, environmental and local policies in order to contribute actively to the improvement of activities concerned - Process of monitoring and balance (energy balance, environmental impact, sustainability, climatic issues) in order to make a fullanalysisof the existing situationand suggestactions for the future - Topics and principal processes related to	- Encourage the adoption ofsustainablebehaviorsby the side of monitored company/authorities - Plan formonitoringof structures, identifying the critical issuesin the fieldof consumption energy - Plan activitiesfor the promotion ofinnovative technologiestolower energy impact	Carry out monitoring and analysis of organizations in the area to assess the present situation and, possibly, suggest the adoption of sustainable technologies

sustainable development with particular attention to environmental and climatic issues in order to developplans to reduceenergy consumption		
Area of activity (Macro- competence) 2: Processing of energy savings plans		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
- Local, national and Community legislation on energy in order to verify its application - Local plans in order to integrate them with energy saving plans - Principles of energy management to optimize consumption of electricity, water and natural gas	-Define targets according to priorities of action - Identify local sources of energy for the elaboration ofenergy savings plans -Designenergy-saving systemstoimprove consumption -Draw up the energy balanceregionalor provincial energy balancein order to studythe impact ofcompany's activity inthe field of energy	Developtheregionalor provincial plan concerning the use ofrenewable energy sourcesin accordance withLaw no.10 of 1991
Area of activity (Macro- competence) 3: Design ofenergy-saving systems		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
-Basics of plant design in order to identify possible modifications to existing plants or	-Applytechniques and technologiesfor the optimization ofenergy consumption -Applytechniques and technologiesfor the	Designstructural systemsand plantsthat produceenergy-savingperformancein company's activities

under development plants in order to improve their performance in energy field. -Principles ofenergy balancefor the constructionand study ofenergy saving plans -Availabletechnologiesfor energysaving	optimizationof water use -Applytechniques and technologiesfor the optimizationofnatural gas use -Identify the bestavailable technologies for theimprovement of plants in order to increase energy saving -Identify possible modification and adaptationstoplants for energy saving -Designingenergy-saving systemsat structural level, improving the management of natural resources	
Area of activity (Macro- competence) 4: Evaluation of energy saving plan ofpublic or private organizations		
KNOWLEDGE	**SKILLS**	**COMPETENCE**
-Best practicesin the context ofsustainabledevelopmentin order to identifythe most important information to be presented asreproduciblemodels -Legislationandlocal, national andinternationaltechnical regulations, (UN, EU, National State, Region) on Sustainable Development -Legislationandtechnical regulationsrelating to the useof renewable sources ofenergyto ensure their application	-Adapt thebest practicesin sustainable developmentinthelocal contextanalysis -Applythe theoretical modelof the three pillarsof sustainability(ecological, economic, socio-cultural) for the analysis/evaluation and programmingof actions, processes and sustainable products -Combiningthe needs ofeconomic and financial sustainabilitywiththoseof environmental sustainability,in order to ensurethe effectivefeasibility of the plan	Verify that thepublic or private organizationsenergy saving planmeets the needsofreducing energy consumptionin the territory

	-Make an energy diagnosis (static energy balance and energy flows balance) in the territory analyzed in order to identify possibleactions to improvetheenergy saving planproposed -Suggestcorrections to theenergy saving plan proposedtoimprove environmental performances -Verifythat the choices madein the developmentofenergy-saving planproposedrespect the principles ofeco - sensitivity	

If necessary, add other charts

C) Description and analysis of the **certification systems** existing in the partner countries.

This analysis will have a prevalently qualitative form, through

1) a description of the architecture and functioning of the evaluation and certification procedures connected with the various training paths regarding the profiles of the energy saving area and corresponding to level 5 of the EQF with reference to the VET training systems described in the chart at point B,
2) a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) of these procedures connected with the possible presence and influence of forms of certification of the sector based on competence evaluation.

The analysis must be between 3 and 7 pages in length, following the format below.

❶ CERTIFICATION SYSTEM ANALYSIS CHART	..... Partner nation

Indicate the various typologies (connected with the certification of the profiles related to energy saving and corresponding to levels 5of the EQF**):**

FILL OUT A CHART FOR EACH TYPE OF SYSTEM REFERRING TO THE TRAINING SYSTEMS DESCRIBED IN THE CHART AT POINT 2

a) Fitter of electrical operation systems for renewable power sources /EQF level 4

b) TEHNICIAN OPERATOR OF RENEWABLE POWER SYSTEM / EQF Level 5

For a and b – VET College (3 years of study after the general education)

❷For each of the typologies indicated :

Available for a and b

What is certified: **Professional qualification**

What entities issue the certification?

Diploma and certificates issues by the Ministry of National Education

What instruments are used for certification?

According to the regulatory documents in force, the evaluation and certification from the vocational and technical Romanian education is designed as an integral part of the learning process and initial vocational training conducted through the school education. At the same time, the evaluation and certification in vocational education and training are suitable for targets and objectives of school education, whose graduates can guide either to tertiary education or the employment market as well as specific objectives of lifelong learning. In this context, the certification is based on the demonstration of competence specified explicitly in the training standards.

An important aspect of the monitoring carried out in technical and vocational education is to ensure consistency between the current assessment and certification purposes, with the complementary principle the goals and objectives of the two forms of assessment. Therefore, the current assessment, continuous, internal skills contribute to the prescribed learning outcomes (competences, units of general skills, technical unit skills and technical expertise units) in the standard of training. This is achieved both in the context of school, by teachers, and from the economic agent (for practical training) by teachers and tutors (specialists appointed the economic operator to guide and track the use of the practice activity).

The evaluation with the aim of certification is achieved through exam, at the end of the vocational training and is contingent of the establishment on the way of formation and the acquisition of all units of standard skills training.

The document regulating the methodological point of view the certification exam is the methodology of organising and conducting professional qualification certification examinations for graduates of vocational and technical education, which began to apply from the 2008-2009 school year. In accordance with the provisions of this document, the assessment for certification EQF levels 3, 4 and 5 qualification training is completed with the acquisition of professional qualification certificates.
By what system or subsystem is the qualification recognised? = national training system =production and social system (training profiles are endorsed by the Sectoral Committees previous to the approval by Ministerial Order)
Indicate any reference regulations (national , regional, etc.): **Law nr. 1/20111 for national education**
Add boxes as necessary duplicating the chart at point 2 for each letter →