Good practices

Student Internship Program for the profession TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS

Innovative vocational education and training in Wielkopolska Wschodnia in the context of energy transformatione

Student Internship Program

for the profession

TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS

311930

The publication was created as part of the project "Innovative vocational education and training in Wielkopolska Wschodnia in the context of energy transformation" (Project No. EOG/21/K3/W/0046) financed by the EEA Financial Mechanism and the budget of the Republic of Poland under the Education Program.
The publication only reflects the position of the authors and the financing entities are not responsible for the substantive content contained therein.

Konin, Oslo, Radom 2023

Contents

1. General assumptions of a student internship carried out in a work environment

The core curriculum for vocational education in the profession of renewable energy equipment and systems technician 311930 includes two qualifications:

- ELE.10. Installation and commissioning of renewable energy devices and systems;
- ELE.11. Operation of renewable energy devices and systems.

A graduate of a school providing training in the profession of a renewable energy equipment and systems technician should be prepared to perform professional tasks:

1) in terms of ELE.10 qualifications. Installation of renewable energy devices and systems:
   a) installation of renewable energy devices and systems,
   b) commissioning renewable energy devices and systems and valuation of works;
2) in terms of ELE.11 qualifications. Operation of renewable energy devices and systems:
   a) performing maintenance and repairs of renewable energy devices and systems,
   b) monitoring and supervision of renewable energy devices and systems,
   c) assessment of the impact of renewable energy devices and systems on the environment.

The basic goal of the internship is to provide students with the opportunity to acquire practical skills and gain professional experience necessary to perform work in real conditions such as those encountered by external stakeholders (employers), and, consequently, to prepare a highly qualified graduate prepared to perform typical professional tasks for the profession of equipment and technology technician. renewable energy systems.

General guidelines for organizing a student internship in a profession[1] and assumptions for its implementation at the employer.

Development of student internship programs carried out in an innovative work environment in the electrical industry **for student internships organized in the profession of technician of renewable energy devices and systems 311930** is:

- the student internship with the employer is aimed at students of technical secondary schools (at least third grade) training to become technicians of renewable energy devices and systems;
- during the student internship, the student may complete all or selected content of the vocational curriculum in the scope of practical learning carried out at the school he attends, or teaching content related to the taught profession not covered by the vocational curriculum;
- entities accepting student internships may be: a natural person running a business, a legal person or a commercial company;
- the entity accepting a student internship concludes a student internship agreement with the student or with the parents of an underage student in writing.
- the school principal may exempt a student who completed a student internship and obtained a certificate from the obligation to complete practical vocational training in whole or in part, if the student participating in the internship completed all or selected content of the vocational education program in the field of practical vocational training provided at school;
- the entity accepting a student internship and the school principal (the coordinator/proxy for professional internships may act on its behalf), in consultation with the student or the parent of an underage student, determine the scope of teaching content referred to in Art. 121a section 2[2] and the daily and weekly duration of the student internship;
- the total daily number of educational activities carried out by the student at school and student internship cannot exceed 8 hours, and the weekly total

[1] Art. 121a. Act of December 14, 2016, Education Law (Journal of Laws of 2020, items 910, 1378, of 2021, items 4, 619).

[2] Act of December 14, 2016, Education Law (Journal of Laws of 2020, items 910, 1378, of 2021, items 4, 619).

number of educational activities carried out by the student at school and student internship - 40 hours ;

- student internships may take place during periods free from educational activities and during summer and winter breaks;
- a student undergoing a student internship receives a monthly cash benefit, unless the parties to the student internship contract decide that the internship is unpaid;
- the amount of the monthly cash benefit may not exceed the amount of the minimum remuneration for work, established on the basis of the Act of 10 October 2002 on minimum remuneration for work (Journal of Laws of 2018, item 2177 and of 2019, item 1564) and the Regulation of September 14, 2021 on the amount of the minimum remuneration for work and the amount of the minimum hourly rate in 2022 ;
- Labor law provisions do not apply to student internships, with the exception of the provisions of Art. 183a–183e, art. 131§ 1, art. 132 § 1, art. 133 § 1, art. 134, art. 1517, art. 204 and art. 232 of the Act of 26 June 1974 - Labor Code, subject to the provisions of section 12–14.

Benefits of the proposed student internship program

For a student pursuing a student internship for the profession of renewable energy equipment and systems technician :

- verification of your professional skills in real working conditions,
- the opportunity to gain additional experience and better adapt to the local labor market by completing an internship, often going beyond the core curriculum of practical vocational training,
- easier start of the professional development path after finishing school. The period of completed student internship is included in the period of employment, on which employee rights depend.
- easier access to potential employers (easier start after finishing school),
- establishing contact with a potential employer and the possibility of later employment as a full-time employee,
- monetary remuneration,

- getting to know the structure of the company's operation, people working in the profession, customers and suppliers.

For employers accepting students for a student internship for the profession of renewable energy equipment and systems technician :

- a real impact on the quality of practical education, adapted to the current needs of the local labor market, by initiating cooperation with vocational schools,
- educating/preparing potentially new staff in a manner consistent with the company's (employer's) profile,
- building a good image of the company (employer) as a partner of industry education,
- initiating cooperation with schools in the development and implementation of changes in vocational education, content and scope of professional tasks,
- reducing costs for the workplace (obtaining a qualified employee, reducing costs related to recruitment and training),
- the possibility of deducting the costs of the internship and the possibility of refunding the salary supplement in connection with serving as the intern's supervisor.

For the school resulting from the implementation of student internships for the profession of technician of renewable energy devices and systems by its students :

- deepening cooperation with employers previously involved in practical education or establishing cooperation with new entities operating on the labor market,
- increasing the chances of school graduates being employed by employers,
- the possibility of expanding the vocational education offer adequate to the needs of the local labor market,
- support in fulfilling the school's tasks resulting from the provisions of education law.

Legal basis for education in professions

Legal basis for the development of the student internship *program for the profession of* ***renewable energy equipment and systems technician*** *311930* :

I. Recommendations of the Council of the European Union:

1. Recommendation of the Council of the European Union of 22 May 2018 on key competences for lifelong learning (OJ EU 2018/C 189/01);
2. Recommendation of the Council of the European Union of 15 March 2018 on a European framework for the quality and effectiveness of apprenticeships (OJ EU 2018/C 153/01);
3. Recommendation of the Council of the European Union of 10 March 2014 on a quality framework for traineeships (OJ EU 2014/C 88/01).

II. Acts:

1. Act of December 14, 2016 - Education Law (i.e. Journal of Laws of 2020, items 910, 1378, of 2021, items 4, 619, 762);
2. Act of December 22, 2015 on the Integrated Qualifications System (i.e. Journal of Laws of 2020, item 226);
3. Act of 7 September 1991 on the education system (i.e. Journal of Laws of 2020,
   item 1327, of 2021, item 4);
4. Act of 26 June 1974, Labor Code (Journal of Laws of 2020, item 1320) .

III. Regulations:

1. Regulation of the Minister of National Education of August 12, 2019 on the template of a certificate of completion of a student internship (Journal of Laws, item 1583);
2. Regulation of the Minister of National Education of May 16, 2019 on the core curriculum for vocational education professions and additional professional skills in selected vocational education professions (Journal of Laws of 2019, item 991, as amended);
3. Regulation of the Minister of National Education of April 3, 2019 on framework teaching plans for public schools (Journal of Laws, item 639);
4. Regulation of the Minister of National Education of March 19, 2019 on continuing education in non-school forms (Journal of Laws, item 652);
5. Regulation of the Minister of National Education of February 22, 2019 on practical vocational training (Journal of Laws, item 391);

6. Regulation of the Minister of National Education of February 22, 2019 on the assessment, classification and promotion of students and listeners in public schools (Journal of Laws, item 373);
7. Regulation of the Minister of National Education of February 15, 2019 on the general objectives and tasks of education in vocational education professions and the classification of vocational education professions (Journal of Laws, item 316);
8. Regulation of the Minister of National Education of August 9, 2017 on the conditions for organizing education, upbringing and care for disabled children and youth, socially maladjusted and at risk of social maladjustment (Journal of Laws of 2020, item 1309);
9. Regulation of the Minister of National Education of August 1, 2017 on detailed qualifications required from teachers (Journal of Laws of 2020, item 1289);
10. Regulation of the Minister of National Education and Sport of December 31, 2002 on safety and hygiene in public and non-public schools and institutions (i.e. Journal of Laws of 2020, item 1604).

2. Organizational assumptions of the student internship

During the internship, the student performs professional activities at work stations designated and prepared for this purpose by the company (for example, indicated and described in the model internship program). Both the buildings constituting the headquarters of the company hosting the internship, as well as the rooms, installations and workstations located therein, should meet the requirements regarding occupational health and safety, operational safety, fire safety and environmental protection regulations.

The employer's preparations for accepting an intern should include the entire scope of activities related to the organization of the workplace in accordance with occupational health and safety regulations. The employer should provide the intern with conditions for completing a student internship that are analogous in terms of social and living conditions to those guaranteed to employees by labor law provisions. Trainee in accordance with Art. 121a section 23[3] during the internship has the right to use social rooms and hygienic and sanitary facilities at the employer's disposal, not only for the purpose of storing footwear, work clothes and personal protective equipment, but above all for meeting life needs during breaks at work and before the start of the daily work. or completion of activities related to the internship.

Persons responsible for the operation of the company accepting a student internship, in consultation with the management of the educational institution, agree with the student, and in the case of a minor student with his or her parents, the scope of professional activities carried out during the internship and the daily and weekly work schedule. The above arrangements should be included in the student internship contract by the parties to this agreement. During the internship, the intern may be excused for a maximum of 20% of the total number of internship hours. The employer may justify the above hours after the intern submits a medical certificate or a document confirming an accidental event that prevents participation in the internship. The intern

[3] Act of December 14, 2016, Education Law (Journal of Laws of 2020, items 910, 1378, of 2021, items 4, 619).

is obliged to work the above hours within the deadline agreed with the management of the entity accepting the internship (applies to unpaid internship).

During the student internship, the student completes all or selected modules of the internship program for the profession of renewable energy equipment and systems technician, including content from the practical vocational training program implemented at the school the intern attends or content related to this profession that was not included by the educational institution in implemented teaching program in the field of practical vocational training.

Details regarding the organizational and legal aspects of coordination of activities during the preparation and implementation of student internships are included in Art. 121a of the Act of December 14, 2016 (Journal of Laws of 2020, item 910). The procedure for implementing these regulations and the stages of organizing internships are presented in the block diagram below for the implementation of practical vocational training as part of a student internship.

The above scheme should make it easier for external and internal stakeholders, primarily the owners and management of companies in the electrical industry, interested students and their parents, and the management of the educational institution to properly prepare for the student internship.

The most important tasks of the director of an educational institution as part of co-organizing student internships include:

- familiarizing external and internal stakeholders with the principles of its implementation,
- indication of educational outcomes and professional activities that are particularly important from the point of view of the correct implementation of the core curriculum in the field of practical training in the profession of a technician of renewable energy devices and systems, and resulting from the analysis of evaluation surveys regarding the assessment of the professional competences of the student-intern, completed before commencing the internship,
- providing the necessary assistance, if necessary, to the employer in terms of formal requirements regarding the internship, its implementation, expected effects and their documentation,

- ongoing mutual exchange of information with the employer about the progress of the internship,
- analysis of the student's documentation from the internship and, based on a certificate issued by the employer, exempting the intern from all or part of the practical vocational training,
- making possible corrections to the implementation of practical vocational training at school in terms of the effects and professional activities carried out during internships,
- conducting an analysis of students' opinions on the course of completed internships,
- conducting an analysis of employers' opinions on the course of completed internships,
- taking the initiative to develop cooperation between the school and the employer.

The director of an educational institution may perform the above tasks personally or authorize other persons who are school employees, i.e. the manager of practical vocational training or teachers or vocational instructors.

2.1. The implementation of the student internship program - number of hours

The duration of the internship is agreed jointly by the employer and the school. In the case of the proposed model student internship program for the profession of renewable energy equipment and systems technician, developed as part of a project from the EEA Financial Mechanism and the budget of the Republic of Poland under the Education Program, it is assumed that the student will participate in the student internship for 60 hours of work.

Within this time, the employer can complete selected modular units. It is recommended that the employer absolutely completes modular units related to preparing the student for the internship (JM.1.1 and JM.2.1) and two selected modular units from among JM.1.2, JM.1.3, JM.2.2, JM.2.3. The employer may complete all or only selected modular units, making the time spent on a modular unit dependent on the pace at which the student achieves learning outcomes. Taking into account the proposed time constraints, the employer may complete two blocks in 2 x mode (6+24) within the planned time of 60 hours. The expected learning outcomes in individual modular units are described in detail in point 4. List of learning outcomes and verification criteria.

The proposed number of hours can be completed on a continuous basis (2 weeks). This solution is recommended due to the continuation of the student's activities day after day. If the internship takes place during the school year, it interferes with the student's classes, which may lead to incomplete implementation of the core curriculum. The internship can be carried out on days free from teaching, because it is a form of additional practical education that goes beyond the framework of the curriculum. The internship may also take place during summer or winter break.

The internship can also be carried out one day a week for 10 weeks. You can set the internship day for a Saturday, which will enable the internship to be carried out during the school year without colliding with the class schedule resulting from the curriculum.

The student internship may also be carried out as part of professional practice. If the internship program overlaps with the professional internship program, it is possible

to count the optional student internship towards the mandatory professional internship or part of it.

2.2. Qualification requirements for internship supervisors in the company

During the student internship, the student is supervised by a supervisor appointed by the entity accepting the internship - an employee of the company.

The internship supervisor may be (provided that Article 120(3a) on no criminal record is met)[4]:

- employer,
- a person running a workplace on behalf of the employer,
- a person employed by an employer.

All guardians must meet the condition specified in Art. 120 section 3a of the Act of 14 December 2016 Education Law (Journal of Laws 2020, item 910)[5] about having no criminal record. Fulfillment of this condition is confirmed by a statement from the student's internship supervisor.

In addition, the internship supervisor should have experience in working and caring for students during internships/apprenticeships in a company or have pedagogical preparation and a willingness to share the acquired knowledge and experience. If the company has not previously accepted interns and none of the employees has teaching qualifications, the internship supervisor should undergo a short training organized e.g. by the school.

The duties of a trainee supervisor in the company include:

- familiarize yourself with the internship program,

[4] Act of December 14, 2016, Education Law (Journal of Laws of 2020, items 910, 1378, of 2021, items 4, 619).

[5] Practical vocational training may be conducted by a person who has not been convicted of an intentional crime against life and health, a crime against sexual freedom and decency, or a crime against family and care, with the exception of the crime specified in Art. 209 of the Act of June 6, 1997 - Penal Code (Journal of Laws of 2020, items 1444 and 1517), an offense specified in Chapter 7 of the Act of July 29, 2005 on counteracting drug addiction, or for whom no judgment has been issued a ban on conducting activities related to the upbringing, treatment, education of minors or taking care of them or a ban on staying in specific environments or places, contacting specific people, approaching specific people or leaving a specific place of residence without the court's consent.

- getting acquainted with the results of the diagnosis of the student's knowledge/skills and manual predispositions (self-assessment survey of the intern's knowledge),
- assigning an appropriate job position in the enterprise (role of the employer accepting the internship),
- compliance with the internship schedule and supervision of its proper implementation,
- observation of the intern's work,
- supporting the intern, providing assistance in performing professional tasks,
- sharing your knowledge and experience,
- documenting working time and professional tasks performed,
- exchange of information between employer, school and intern,
- providing feedback to the employer accepting the internship about the skills acquired by the intern in order to issue a certificate of completion of the student internship.

2.3. Examples of equipment for intern workstations

The intern performs his work during the internship at a designated position, designated by the employer or the student internship supervisor on his behalf.

In the company carrying out the internship, in addition to the technical and operational documentation of the apparatus, machines and devices that equip the intern's workplace, there should be a detailed description of the position. The job description must contain important information from the point of view of the trainee employee and the employer. The intern should undergo on-the-job training and read the job description before starting professional activities.

The job description prepared in the company implementing the student internship should include the following information:

- name of the position,
- purpose of the workstation, including its importance in the technological process of the enterprise,
- the position of the position in the company's organizational structure and its location in the enterprise,
- a list of equipment, tools and devices that the intern will use to perform professional tasks and activities,
- indication of the internship supervisor and his direct superior,
- scope of responsibility in the position, i.e. defining what the intern is responsible for before the internship supervisor and the employer,
- basic professional tasks and activities, i.e. the duties of the intern that he performs at this job position,
- the employee's rights in the position, i.e. an indication of the activities that the intern is authorized to perform,
- hazards at the workplace, i.e. determining possible hazardous factors related to work at this position (if possible in the form of an occupational risk assessment card for a given workplace),

When preparing to organize an internship, remember that in individual plants, job positions where the same activities and professional tasks can be performed may have different names. Therefore, the basic factor determining the allocation of a position for

an internship in the profession of renewable energy equipment and systems technician should be its description containing a list of equipment and the scope of tasks and professional activities performed, and not its formal name.

A necessary condition for completing a student internship is that the student can perform professional activities and tasks at work stations consistent with the field of education in the profession of renewable energy equipment and systems technician.

Description and sample equipment of workstations to which the intern should have access in the event of completing specific modules from the internship program for the profession of technician for renewable energy devices and systems:

1. Station for installation of renewable energy systems

Examples of equipment for installation of renewable energy systems:

- electrical and electronic components, including power supplies, logic units and indicators, function generators, relays and contactors, time relays, switches and switches, indicators, signaling devices, electric cables, electrical components, renewable energy devices and systems,
- measuring instruments for measuring electrical quantities, renewable energy systems (analog and digital),
- tools and devices for assembly and disassembly of electrical components and renewable energy systems,
- a set of tools for assembly and disassembly of electrical components and renewable energy systems (screwdrivers, combination pliers, flat and round nose pliers, side cutting pliers, tweezers, etc.),
- soldering station with tips, electric binder suction machine, hot air station with nozzles,
- tools and devices for making pipe connections and installing pipeline sections,
- devices and equipment for making threaded, soldered, welded, welded, glued and crimped connections;
- a computer with a printer equipped with communication interfaces or standard converters enabling the connection of a regulator and a frequency converter, connected to a local network with Internet access, with software compliant with the standards for programming regulators and frequency converters,

- technical documentation of renewable energy devices and systems.

2. Station for making electrical connections

Example equipment of a mechanical assembly station:

- emergency switch and central switch,
- calipers , micrometers, sensors, angle measuring devices, prism level , thread outline and pitch standards,
- technical documentation of the installed elements, subassemblies and electrical assemblies.

4. Stand for assembling renewable energy systems

Examples of equipment for installation of renewable energy systems:

- table drill, grinder-sharpener and/or grinder, table with a vice and tool drawers, a set of basic locksmith and assembly tools, sets of drills, reamers, center drills, taps, riveters with a set of rivets,
- tools and devices for the assembly and disassembly of threaded, soldered, welded, glued and clamped connections,
- tools and devices for assembly and disassembly of components and assemblies from pipes,
- technical documentation of installed elements, subassemblies and assemblies connected with pipes.
- hydraulic components, elements and assemblies (including oil station, valves, electrovalves and electrohydraulic transducers, hydraulic engines and actuators, sensors, hydraulic lines),
- tools and devices for assembly and disassembly of renewable energy systems,
- tools and instruments for assembly and disassembly of renewable energy systems;
- technical documentation of installed elements, subassemblies and assemblies of renewable energy systems.

2.4. Requirements for students implementing the internship program

People starting a student internship in an enterprise should attend a technical school (minimum class III) and train as a technician of renewable energy devices and systems - 311930.

In order to take part in an internship, a student must have appropriate medical examinations proving that there are no contraindications to work. Health contraindications to undertaking an internship with an employer are analogous to the guidelines that apply to preventive examinations of candidates for schools conducted pursuant to the regulation of the Minister of Health of August 26, 2019 on medical examinations of candidates for secondary or higher schools and qualifying vocational courses, pupils and students of these schools, students, students of qualifying vocational courses and doctoral students (Journal of Laws 2019.1651).

The lack of contraindications to completing a student internship should be confirmed by a certificate from an authorized occupational medicine doctor.

The most important responsibilities of an intern during a student internship include:

1. Concluding an agreement with the company implementing the student internship before it begins.
2. Compliance with the work regulations applicable in the company providing the student internship.
3. Compliance with the occupational health and safety rules and fire protection regulations applicable in the workplace. and environmental protection.
4. Undertaking the internship on the indicated date and place.
5. Conscientious and careful performance of professional activities and tasks specified in the student internship program.
6. Complying with the instructions of the student internship supervisor, unless they are contrary to the law.
7. Compliance with the established daily and weekly time for the student internship.
8. Possessing and keeping an ongoing diary of the student internship course,
9. Informing the supervisor about any accidents while performing tasks.

10. Reporting to the supervisor/internship supervisor any incident at the workplace that could affect the safety of performing professional activities and tasks.
11. Submitting documentation confirming the course of the internship at school immediately after its completion (e.g. a diary with a record of all activities and tasks performed daily during the internship, confirmed by the signature of the internship supervisor, certificates of completion of the internship with a list of acquired skills).
12. Improving professional skills in the profession of technician of renewable energy devices and systems indicated in the internship program.
13. The intern has the right to resign from participation in the student internship without incurring any financial consequences (e.g. reimbursement of costs incurred by the employer at the stage of preparing the internship or during its duration) if the resignation is due to reasons beyond his control and making it impossible to complete the internship program, in particular caused by inability to work due to illness or other important accidental reasons. In the event of excessive, unjustified absence or resignation from the internship during the internship and for reasons attributable to the intern, the intern may not receive a certificate of completion of the internship and part or all of the remuneration (if any).

3. Objectives of implementing internships in the form of professional tasks

Students who complete an internship in a company will gain practical experience in selected professional skills, such as:

1) performing measurements of electrical and non-electrical quantities,
2) performing calculations of parameters characterizing the flow of liquid and gas,
3) preparing conceptual and assembly diagrams of electrical systems,
4) using technical documentation during the installation of renewable energy devices and systems,
5) installation of renewable energy devices and systems;
6) performing work in the field of technical inspections of renewable energy devices and systems,
7) performing maintenance work on parts, components, assemblies, devices and renewable energy systems,
8) commissioning renewable energy devices and systems,
9) configuring parameters of renewable energy devices and systems,
10) preparing cost estimates for works related to the installation of renewable energy devices and systems,
11) commissioning renewable energy devices and systems,
12) preparation of operational documentation for electrical systems,
13) determining the location of renewable energy devices and systems.

A graduate of a school educating a technician of renewable energy devices and systems will acquire skills during the internship that he or she can use in the future during:

- working as a technical supervision technician, installation technician of renewable energy devices and systems, energy advisor, installer and installation service technician ,
- work as a specialist in laboratories of industrial plants, research and development centers, technology offices, production halls,
- running your own service and consulting company.

General purposes

Completing an internship in a company will allow the student to achieve selected general goals:

1) installation of renewable energy devices and systems,
2) commissioning renewable energy devices and systems and valuation of works,
3) performing maintenance and repairs of renewable energy devices and systems,
4) monitoring and supervision of renewable energy devices and systems,
5) assessment of the impact of renewable energy devices and systems on the environment.

Operational goals

Completing an internship in a company will allow the student to achieve selected operational goals. Achieving operational goals depends on the completed modular units.

As a result of completing the student internship, the student will improve their practical skills and will be able to:

1) organize the workplace in accordance with occupational health and safety regulations,
2) perform basic measurements of electrical and non-electrical quantities,
3) perform calculations of parameters characterizing the flow of liquids and gases,
4) indicate the benefits of using energy from renewable sources,
5) prepare conceptual and assembly diagrams of electrical systems and renewable energy systems,
6) use technical documentation when installing renewable energy devices and systems,
7) apply installation instructions for renewable energy devices and systems during work,
8) perform assembly and disassembly of renewable energy devices and systems,
9) determine the conditions for the location of renewable energy devices and systems,
10) maintain documentation of the transport, storage of materials, devices and elements of renewable energy systems;
11) preparing demand for renewable energy devices and systems,

12) perform sanitary and electrical installations,
13) perform installation of renewable energy devices and systems;
14) install measuring devices in renewable energy systems,
15) prepare cost estimates for works related to the installation of renewable energy devices and systems,
16) assess the profitability of installing renewable energy devices and systems,
17) carry out measurements of renewable energy devices and systems;
18) regulate automatic control systems for renewable energy systems,
19) control the technical condition of systems for obtaining renewable and thermal energy;
20) .conduct inspections of renewable energy devices and systems;
21) maintain, repair and dismantle installations of renewable energy systems,
22) conduct rational management of waste generated during the installation and operation of equipment used in renewable energy

For the purposes of the project, it was assumed that the minimum number of hours allocated for a student internship is 60 hours, and the employer may complete all or selected modular units during the internship. Therefore, during the internships, only the above-mentioned goals that are related to the modular units selected by the employer will be achieved.

4. Internship program

In the profession of renewable energy equipment and systems technician 311930, there are two separate qualifications:

- ELE.10. Installation and commissioning of renewable energy devices and systems.
- ELM.11. Operation of renewable energy devices and systems.

The developed Model Student Internship Program was based on a modular structure. Two modules have been separated:

M1. Installation and commissioning of renewable energy devices and systems within the scope of ELE.10 qualifications. Installation and commissioning of renewable energy devices and systems

M2. Operation of renewable energy devices and systems within the scope of ELE.11 qualifications. Operation of renewable energy devices and systems.

Modular units have been assigned to each module and an approximate number of hours to complete this unit during the student internship.

The table below presents the internship plan, including the division of the program into modules and modular units.

Module **Symbol Name**	**Topics of methodological units (modular units)** **Symbol Name**	**Approximate number of hours**
M.1. Installation and commissioning of renewable energy devices and systems	JM.1.1. Conducting training in the field of occupational health and safety	6[6]
	JM.1.2. Installation of renewable energy devices and systems	24
	JM.1.3. Commissioning of renewable energy devices and systems	24

[6] The intern is obliged to undergo initial and on-the-job training in accordance with the provisions of the Regulation of the Minister of Economy and Labor of July 27, 2004 on occupational health and safety training. If modular units from both modules have been selected for the internship plan, the initial training is performed once (JM.1.1. or JM.2.1).

Module **Symbol Name**	**Topics of methodological units (modular units)** **Symbol Name**	**Approximate number of hours**
M.2. Operation of renewable energy devices and systems	JM.2.1. Conducting training in the field of occupational health and safety	6 [5]
	JM.2.2. Maintaining renewable energy systems	24
	JM.2.3. Diagnosing and repairing renewable energy devices and systems	24

Based on the program's didactic map, the employer selects modular units within the module or modules that the student will complete at the workplace. The hourly number of methodological units is given above as indicative and can be adapted to the needs of a specific internship.

The proposed total number of hours completed by the intern during the internship is 60 for the pilot internship implemented under the project.

For example, workplace A, due to its production profile and equipment, will offer the intern an internship in the field of modular units: JM.1.1. (obligatory initial training) 6 hours, JM.1.2. 18 hours, JM.2.2. 24 hours and JM.2.3. for 12 hours. This gives a total number of 60 hours of student internship.

Proposed methods for checking and assessing the trainee's educational achievements

The degree to which trainees have acquired skills and competences as part of a qualification separate from the profession will be verified by assessing the correctness of performing professional tasks in real working conditions of specialists in the field of renewable energy devices and systems. During the evaluation, general criteria should be taken into account, in particular the substantive importance of individual tasks, the involvement of interns, the correctness of the solutions they proposed, as well as the quality and diligence of execution. Verification of the interns' achievements should be carried out systematically throughout the entire period of the student internship program, based on the criteria presented to the interns at the beginning of the program.

Due to the specificity of a student internship, the internship supervisor may use the project method to assess the level of skill mastery on an ongoing basis.

Practical skills should be checked primarily on the basis of observation of professional activities performed by the intern during the internship. During the observation, the internship supervisor should pay special attention to:

- searching and processing information obtained from technical documentation,
- substantive correctness of the tasks performed,
- teamwork.

In this aspect, it is particularly important to assess the substantive correctness of the tasks performed, which should be assessed in the category: the intern can or cannot perform a specific professional task correctly.

During the final assessment, it is advisable that the employer and the internship supervisor use an evaluation survey to assess the intern's professional competences as a diagnostic tool. The final grade should result from ongoing observation of the intern's performance of professional tasks and the intern's self-assessment expressed by the student not only when completing the survey, but also during the final interview that the employer and the internship supervisor should organize as part of the evaluation of the student internship.

5. List of learning outcomes and verification criteria

Module name **M.1. Installation and commissioning of renewable energy devices and systems**
Operational goals of the module: The intern is able to: 1) organize the workplace in accordance with occupational health and safety regulations, 2) perform basic measurements of electrical and non-electrical quantities, 3) perform calculations of parameters characterizing the flow of liquids and gases, 4) indicate the benefits of using energy from renewable sources, 5) prepare conceptual and assembly diagrams of electrical systems and renewable energy systems, 6) use technical documentation when installing renewable energy devices and systems, 7) apply installation instructions for renewable energy devices and systems during work, 8) perform assembly and disassembly of renewable energy devices and systems, 9) determine the conditions for the location of renewable energy devices and systems, 10) maintain documentation of transport, storage of materials, devices and elements of renewable energy systems, 11) preparing demand for renewable energy devices and systems, 12) perform sanitary and electrical installations, 13) perform installation of renewable energy devices and systems, 14) install measuring devices in renewable energy systems. 15) prepare cost estimates for works related to the installation of renewable energy devices and systems, 16) assess the profitability of installing renewable energy devices and systems.

Name of the modular unit **JM.1.1. Conducting training in the field of occupational health and safety**		
Acquired skills and competences The intern is able to :	**Learning outcomes from the core curriculum** Trainee:	**Verification criteria from the core curriculum** Trainee:
– apply the principles of occupational health and safety, fire protection, antistatic protection and environmental protection	1) applies the principles of occupational health and safety, fire protection, antistatic protection and environmental protection	1) recognizes environmental hazards related to work in the profession 2) follows the rules of conduct in the event of a fire hazard
– organize the workstation when performing professional tasks in accordance with the requirements of ergonomics, occupational health and safety regulations, fire protection, antistatic protection and environmental protection	1) organizes the workstation when performing professional tasks in accordance with ergonomic requirements, occupational health and safety regulations, fire protection, antistatic protection and environmental protection	1) selects workplace equipment in terms of ergonomics 2) assesses the preparation of the workplace in terms of potential threats to humans and the environment
– use individual and collective protective equipment when performing professional tasks	1) uses individual and collective protective equipment when performing professional tasks	1) selects individual and collective protective equipment for the type of work performed 2) uses individual and collective protective equipment at the workplace

		3) uses anti-shock and personal protective equipment when connecting devices to the electrical network
– provide first aid in the event of a health emergency	1) provides first aid in cases of sudden health threats	1) protects himself, the injured party and the accident site 2) puts the injured person in a safe position 3) notifies the appropriate services
Name of the modular unit **JM.1.2. Installation of renewable energy devices and systems**		
Acquired skills and competences The intern is able to :	**Learning outcomes from the core curriculum** Trainee:	**Verification criteria from the core curriculum** Trainee:
– use technical documentation and assembly instructions for the installation of renewable energy devices and systems	1) uses construction documentation	1) uses technical documentation when assembling renewable energy devices and systems 2) applies installation instructions for renewable energy devices and systems during work
– determine the conditions for locating renewable energy devices to meet the client's needs	1) determines the conditions for the location of renewable energy devices	1) specifies the conditions for the location of devices used in solar collector installations , photovoltaic devices and heat pumps 2) specifies the conditions for the location of devices using biomass

		3) specifies the conditions for the location of devices using wind and water energy 4) specifies the place of installation of solar collectors, photovoltaic cells and heat pumps 5) specifies the place of installation of biomass-using devices 6) specifies the place of installation of the wind power plant and water power plant
– determine the method of transport and storage of materials, devices and elements of renewable energy systems	2) maintains documentation of the transport and storage of materials, devices and elements of renewable energy systems	1) defines the method of transporting materials, devices and elements of renewable energy systems 2) specifies the conditions for storing materials, devices and elements of renewable energy systems 3) specifies the conditions for storing materials, devices and elements of renewable energy systems 4) prepares documentation related to the storage of materials, devices and elements of renewable energy systems
– prepare demand for renewable energy devices and systems	3) prepares demand for renewable energy devices and systems	1) prepares a list of materials and equipment for the installation of renewable energy installations 2) prepares a list of materials and devices for the installation of electrical installations

– assemble tools and equipment for assembling devices and installing renewable energy systems	4) completes tools and equipment for assembling devices and installing renewable energy systems	1) classifies tools and equipment for the assembly of renewable energy devices and systems 2) distinguishes tools and equipment for the assembly of renewable energy installations, devices and systems 3) selects tools and equipment for the assembly of renewable energy installations, devices and systems
– select technologies for assembling devices and installing renewable energy systems	5) characterizes technologies for assembling devices and installing renewable energy systems	5) specifies materials for the installation of water, gas and heating installations 6) specifies materials for the installation of electrical installations 7) distinguishes solar collector installation technologies 8) distinguishes heat pump installation technologies 9) distinguishes technologies for assembling biomass burning devices 10) distinguishes technologies for mounting photovoltaic cells 11) distinguishes technologies for assembling devices using wind energy 12) distinguishes technologies for assembling devices using wind energy
– select tools for installing	6) characterizes tools for assembling installations and	1) classifies tools for assembling renewable energy installations and devices

installations and devices of renewable energy systems	devices of renewable energy systems	2) distinguishes tools for assembling installations and devices of renewable energy systems
– install renewable energy devices and systems	3) performs installation of renewable energy devices and systems	1) assembles devices and installations of systems for obtaining renewable thermal energy 2) assembles devices and installations of systems for obtaining renewable thermal energy
– perform electrical installations	1) performs electrical installations	1) selects devices and tools for performing electrical installations 2) performs electrical installations in accordance with the documentation
– perform sanitary installations	1) performs sanitary installations	1) selects devices and tools used to perform piping installations 2) performs piping installations in accordance with the documentation
– make hydraulic connections based on technical documentation	1) makes hydraulic connections based on technical documentation	1) designates hydraulic pipe routes based on technical documentation 2) prepares installation equipment for assembly 3) installs installation equipment in accordance with assembly rules

		4) arranges hydraulic lines in accordance with the documentation
– define the rules for installing elements and devices of renewable energy systems on detachable process connections	1) defines the rules for installing renewable energy elements and systems on detachable process connections	1) distinguishes types of connections for renewable energy devices and systems 2) recognizes sealing materials for connections between renewable energy devices and systems 3) selects materials for the assembly of renewable energy elements, devices and systems based on technical documentation 4) selects tools for the assembly of renewable energy elements, devices and systems based on technical documentation
Name of the modular unit **JM. 1.3. Commissioning of renewable energy devices and systems**		
Acquired skills and competences The intern is able to :	**Learning outcomes from the core curriculum** Trainee:	**Verification criteria from the core curriculum** Trainee:
– configure renewable energy devices and systems	1) performs installation of measuring devices in renewable energy systems	1) classifies measuring devices used in renewable energy systems 2) specifies the place of installation of measurement sensors 3) specifies the place of installation of control and security signals

		4) installs measuring devices in pipe installations 5) installs measuring devices in electrical installations
– check the correctness of assembly of devices and installations of renewable energy systems	2) assesses the correctness of assembly of devices and installations of renewable energy systems	1) specifies the technical conditions for carrying out assembly works 2) assesses the quality of installation works of renewable energy devices and systems 3) indicates irregularities occurring during the installation of the electrical installation 4) indicates irregularities occurring during the installation of piping systems
– activate renewable energy devices and systems depending on the type of installation	1) launches renewable energy devices and systems	1) launches installations for obtaining renewable electricity 2) launches installations for obtaining renewable thermal energy 3) specifies the conditions for acceptance of renewable thermal energy systems 4) specifies the conditions for the acceptance of renewable energy systems
– launch renewable energy devices and systems in accordance with procedures	1) complies with the procedures for commissioning renewable energy devices and systems	1) defines procedures for commissioning renewable energy equipment and systems

		2) applies procedures for commissioning renewable energy devices and systems
– prepare cost estimates for works related to the installation of renewable energy devices and systems for the client	1) prepares cost estimates for works related to the installation of renewable energy devices and systems	1) classifies the costs of installing renewable energy devices and systems 2) determines the cost components of installation of renewable energy devices and systems 3) defines the rules for calculating costs related to the installation of renewable energy devices and systems 4) distinguishes types of cost estimates 5) reads data from catalogs and cost estimates, catalogs of manufacturers of materials, devices and installation elements used in renewable energy systems 6) performs bills of quantities and measurements of works related to the installation of renewable energy devices and systems 7) prepares cost estimates for the installation of renewable energy devices and systems
– assess the profitability of installing renewable energy equipment and systems for the client	1) assesses the profitability of renewable energy installations, devices and systems	1) discusses the concept of energy efficiency

		2) distinguishes energy efficiency indicators for renewable energy devices and systems 3) calculates energy efficiency indicators for renewable energy devices and systems 4) analyzes calculated energy efficiency indicators

Social and personal competences and criteria for their verification

During the implementation of modular units, the intern develops social and personal competences:

1) observes the principles of personal culture and professional ethics;
   verification criteria:
   - applies the principles of personal culture and generally accepted norms of behavior in the work environment,
   - accepts responsibility for entrusted professional information,
   - respects the rules regarding confidentiality related to the profession taught and the workplace,
2) plans the task;
   verification criteria:
   - carries out activities within the prescribed time,
   - monitors the implementation of planned activities,
   - performs self-assessment of the work performed;
3) is responsible for the actions taken,
   verification criteria:
   - demonstrates awareness of responsibility for the work performed and evaluates the actions taken,
   - provides for the consequences of improper performance of professional activities at the workplace, including the use of hazardous substances and improper use of machines and devices at the workplace,
4) demonstrates creativity and openness to change;
   verification criteria:
   - proposes ways to solve problems related to performing professional tasks in unpredictable conditions,

- indicates examples of introducing a change and assesses the effects of its introduction,

5) uses stress coping techniques;

verification criteria:

- recognizes sources of stress while performing professional tasks,
- indicates the most common causes of stressful situations at work,
- chooses stress coping techniques appropriate to the situation,

6) improves professional skills;

verification criteria:

- defines the scope of skills and competences necessary to perform the profession,
- analyzes own competences,
- sets own professional development goals,
- obtains professional information about the industry from various sources,

7) applies the principles of interpersonal communication;

verification criteria:

- identifies verbal and non-verbal signals,
- uses active listening methods,
- leads the discussion,
- provides feedback,

8) applies problem-solving methods and techniques;

verification criteria:

- describes how to counteract problems in the team carrying out tasks,
- describes problem-solving techniques,

9) cooperates in a team;

verification criteria:

- works in a team, taking responsibility for jointly performed tasks,
- respects the division of roles, tasks and responsibilities in the team,
- engages in the implementation of joint team activities,

modifies behavior, taking into account the position developed together with other team members.

Module name

M.2. Operation of renewable energy devices and systems

Operational goals of the module:

The intern is able to:

1) organize the workplace in accordance with occupational health and safety regulations,
2) perform basic measurements of electrical and non-electrical quantities,
3) carry out measurements of renewable energy devices and systems;
4) regulate automatic control systems for renewable energy systems,
5) control the technical condition of systems for obtaining renewable and thermal energy;
6) .conduct inspections of renewable energy devices and systems;
7) maintain, repair and dismantle installations of renewable energy systems,
8) conduct rational management of waste generated during the installation and operation of equipment used in renewable energy.

Name of the modular unit

JM.2.1. Conducting training in the field of occupational health and safety

Acquired skills and competences The intern is able to:	**Learning outcomes from the core curriculum** Trainee:	**Verification criteria from the core curriculum** Trainee:
– organize the workstation when performing professional tasks in accordance with ergonomic requirements, occupational health and safety regulations, fire	1) organizes the workstation when performing professional tasks in accordance with ergonomic requirements, occupational health and safety regulations, fire	1) selects workplace equipment in terms of ergonomics 2) assesses the preparation of the workplace in terms of potential threats to humans and the environment

protection, antistatic protection and environmental protection	protection, antistatic protection and environmental protection	
– use individual and collective protective equipment when performing professional tasks	1) uses individual and collective protective equipment when performing professional tasks	2) selects individual and collective protective equipment for the type of work performed 3) uses individual and collective protective equipment at the workplace 4) uses personal protective equipment when connecting devices to the electrical network
– indicate the tasks and powers of institutions and services operating in the field of labor protection and environmental protection	1) distinguishes the tasks and powers of institutions and services operating in the field of labor protection and environmental protection	1) lists institutions and services operating in the field of labor protection and environmental protection 2) lists the tasks and powers of institutions and services operating in the field of labor protection and environmental protection
Name of the modular unit **JM.2.2. Maintaining renewable energy systems**		
Acquired skills and competences The intern is able to:	**Learning outcomes from the core curriculum** Trainee:	**Verification criteria from the core curriculum** Trainee:
– carry out measurements of renewable energy	1) carries out measurements of renewable energy devices and systems	1) distinguishes the flow parameters of liquids and gases 2) performs measurements of liquid and gas flow parameters

devices and systems		3) interprets the readings of control and measurement equipment for the flow of liquids and gases 4) distinguishes electrical parameters of renewable energy devices and systems 5) performs measurements of electrical parameters of renewable energy devices and systems 6) interprets the results of measurements of electrical parameters of renewable energy devices and systems 7) prepares documentation of the measurements performed
– make adjustments to automatic control systems for renewable energy systems	1) regulates automatic control systems for renewable energy systems	1) defines the function of renewable energy elements, devices and systems 2) describes the operation of control and regulation systems 3) defines the structure and principles of operation of renewable energy elements, devices and systems 4) r recognizes the parameters of electronic control elements and systems 5) sets the parameters of electronic components and systems for controlling renewable energy systems

– control the technical condition of systems for obtaining renewable electricity and heat	1) checks the technical condition of systems for obtaining renewable electricity and heat	1) determines the technical condition of elements of renewable thermal energy installations 2) determines the technical condition of components of renewable electricity installations 3) assesses the technical condition of systems 4) recognizes irregularities in the functioning of renewable thermal energy systems 5) recognizes irregularities in the functioning of renewable energy systems
Name of the modular unit **JM.2.3. Diagnosing and repairing renewable energy devices and systems**		
Acquired skills and competences The intern is able to:	**Learning outcomes from the core curriculum** Trainee:	**Verification criteria from the core curriculum** Trainee:
– carry out inspections of renewable energy devices and systems	1) conducts inspections of renewable energy devices and systems	1) uses manuals for operation and maintenance of renewable energy devices and systems 2) performs periodic inspections of renewable energy devices and systems 3) specifies the scope of inspections of renewable thermal energy devices and systems

		4) specifies the scope of inspections of renewable energy devices and systems 5) performs ongoing inspections of renewable thermal energy devices and systems 6) specifies the scope of inspections of renewable energy system devices 7) performs ongoing inspections of renewable energy equipment and systems 8) prepares a report on inspections of renewable energy devices and systems
– carry out maintenance, repairs and dismantling of renewable energy system installations	1) performs work related to the maintenance, repair and dismantling of renewable energy system installations	1) defines the scope of work related to the maintenance of renewable energy devices and systems 2) performs work related to the maintenance, repair and dismantling of water, gas and heating installations 3) performs work related to the maintenance, repair and dismantling of ventilation and air-conditioning installations 4) performs activities related to the maintenance and repair of solar, photovoltaic and heat pump installations 5) performs activities related to the maintenance and repair of biomass boiler installations

		6) performs activities related to the maintenance and repair of wind and water energy installations
– remove the causes of incorrect functioning of renewable energy devices and systems	1) removes the causes of incorrect functioning of renewable energy devices and systems	1) classifies irregularities in the operation of energy devices 2) determines the causes of irregularities in the operation of energy devices 3) specifies ways to remove irregularities in the operation of renewable energy devices 4) defines the scope of work related to the repair of renewable energy devices and systems 5) regulates the parameters of renewable energy devices 6) replaces damaged elements of renewable energy systems
– check the correct operation of renewable energy devices and systems	1) checks the correct operation of renewable energy devices and systems	1) determines possible damage to renewable energy devices and systems 2) checks the configuration of renewable energy devices and systems with technical documentation 3) conducts functional tests of renewable energy devices and systems
– carry out an inventory of devices	1) conducts an inventory of renewable energy devices and systems	1) determines the actual state of resources of renewable energy systems

		2) prepares inventory sketches of renewable energy system installations

Social and personal competences and criteria for their verification

During the implementation of modular units, the intern develops social and personal competences:

1) observes the principles of personal culture and professional ethics;
   verification criteria:
   - applies the principles of personal culture and generally accepted norms of behavior in the work environment,
   - accepts responsibility for entrusted professional information,
   - respects the rules regarding confidentiality related to the profession taught and the workplace,
2) plans the task;
   verification criteria:
   - carries out activities within the prescribed time,
   - monitors the implementation of planned activities,
   - performs self-assessment of the work performed,
3) is responsible for the actions taken;
   verification criteria:
   - demonstrates awareness of responsibility for the work performed and evaluates the actions taken,
   - provides for the consequences of improper performance of professional activities at the workplace, including the use of hazardous substances and improper use of machines and devices at the workplace,
4) demonstrates creativity and openness to change;
   verification criteria:
   - proposes ways to solve problems related to performing professional tasks in unpredictable conditions,
   - indicates examples of introducing a change and assesses the effects of its introduction,

5) uses stress coping techniques;

verification criteria:

- recognizes sources of stress while performing professional tasks,
- indicates the most common causes of stressful situations at work,
- chooses stress coping techniques appropriate to the situation,

6) improves professional skills;

verification criteria:

- defines the scope of skills and competences necessary to perform the profession,
- analyzes own competences,
- sets own professional development goals,
- obtains professional information about the industry from various sources,

7) applies the principles of interpersonal communication;

verification criteria:

- identifies verbal and non-verbal signals,
- uses active listening methods,
- leads the discussion,
- provides feedback,

8) applies problem-solving methods and techniques;

verification criteria:

- describes how to counteract problems in the team carrying out tasks,
- describes problem-solving techniques,

9) cooperates in a team;

verification criteria:

- works in a team, taking responsibility for jointly performed tasks,
- respects the division of roles, tasks and responsibilities in the team,
- engages in the implementation of joint team activities,

modifies behavior, taking into account the position developed together with other team members.

6. Plan for implementing an internship in the company

Position **work**	**Type** **tasks performed**	**Acquired skills** **and competences as part of a qualification separate in the profession** **TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS 311930** The intern is able to:
A stand for the installation of renewable energy systems	1. Performing measurements of electrical and non-electric quantities in renewable energy systems 2. Performing calculations of parameters characterizing the flow of liquids and gases 3. Assessing the technical condition of elements and subassemblies of renewable energy systems prepared for installation 4. Assembly and disassembly of elements and subassemblies of renewable energy systems 5. Checking the correctness of assembly of renewable energy system elements 6. Checking the compliance of the assembly of elements and	– use conceptual and assembly diagrams of electrical systems – perform measurements of electrical quantities – make electrical connections based on technical documentation – perform measurements of cable and wire parameters – measure parameters of renewable energy systems – install renewable energy systems in accordance with technical documentation – connect elements and devices of renewable energy systems – connect renewable energy devices and systems to the power supply installation – configure renewable energy devices and systems based on technical documentation

Position **work**	**Type** **tasks performed**	**Acquired skills** **and competences as part of a qualification separate in the profession** **TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS 311930** The intern is able to:
	subassemblies of renewable energy systems with the technical documentation 7. Assembly of elements of devices and installations for obtaining renewable energy 8. Assembly of devices and installations of systems for obtaining renewable electricity 9. Making electrical connections of renewable energy elements and systems in accordance with technical documentation 10. Device configuration and renewable energy systems 11. Performing measurements to check the correct operation of renewable energy systems	– launch renewable energy devices and systems – select instruments to perform measurements to check the correct operation of renewable energy devices and systems – check the correct operation of renewable energy devices and systems – use tools for assembling renewable energy devices and systems – perform periodic inspections and maintenance of renewable energy devices and systems based on technical documentation – carry out tests of renewable energy devices and systems – assess the technical condition of renewable energy devices and systems – assess the technical condition of renewable energy devices and systems based on measurements

Position **work**	**Type** **tasks performed**	**Acquired skills** **and competences as part of a qualification separate in the profession** **TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS 311930** The intern is able to:
	12. Monitoring the operation of renewable energy devices and systems 13. Performing technical inspections of renewable energy devices and systems 14. Performing measurements of physical quantities in renewable energy devices and systems 15. Performing maintenance work on components and devices of renewable energy systems 16. Testing the operation of renewable energy devices and systems 17. Assessing the technical condition of renewable energy elements and systems 18. Repairing components and devices of renewable energy systems	performed and guidelines included in the technical documentation - locate damage in renewable energy devices and systems - determine the type and scope of repairs of renewable energy devices and systems - select tools to repair renewable energy devices and systems - select components for repairs of renewable energy devices and systems - replace damaged elements in renewable energy devices and systems - check the correct operation of renewable energy devices and systems - prepare current operational documentation of renewable energy devices and systems

Position **work**	**Type** **tasks performed**	**Acquired skills** **and competences as part of a qualification separate in the profession** **TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS 311930** The intern is able to:
	19. Analyzing operational documentation of renewable energy devices and systems	
Station for making electrical connections	1. Performing measurements of geometric quantities 2. Performing work related to manual processing of materials 3. Production of detachable and non-separable process connection elements (threading, riveting, drilling, punching, etc.)	– select tools and materials for mechanical assembly of renewable energy devices and systems – perform manual processing of parts of renewable energy devices and systems
A stand for assembling renewable energy systems	1. Performing measurements of quantities in hydraulic systems 2. Assessing the technical condition of elements, subassemblies and hydraulic assemblies prepared for installation	– select hydraulic cables for electrical installations of renewable energy devices and systems – make hydraulic connections based on technical documentation – distinguish hydraulic elements and devices of renewable energy devices and systems based on their appearance and markings

Position **work**	**Type** **tasks performed**	**Acquired skills** **and competences as part of a qualification separate in the profession** **TECHNICIAN OF RENEWABLE ENERGY DEVICES AND SYSTEMS 311930** The intern is able to:
	3. Assembly and disassembly of hydraulic components and assemblies 4. Checking the correctness of assembly of hydraulic elements, subassemblies and assemblies 5. Checking the compliance of the assembly of elements, subassemblies and hydraulic assemblies with the technical documentation	

7. Evaluation of the internship program

Vocational training is an area of education that has a huge impact on providing modern staff for the Polish economy. One of the activities aimed at preparing future staff is practical vocational training in the workplace. Properly prepared and conducted professional internships allow you to acquire professional and soft skills useful in the enterprise and allow you to consciously enter the labor market.

Below are the minimum requirements that should be taken into account when implementing student internships, in particular how to ensure their quality and document it.

Student internships[7] should be carried out in accordance with the Polish Quality Framework for Internships and Apprenticeships[8] and the European framework for professional internships[9].

Monitoring the quality of student internships should cover the following thematic areas:

- organization of internships - formal and organizational requirements and their verification,
- implementation of internships - assessment of the quality of support provided/requirements substantive.

[7]Act of December 14, 2016, Education Law (Journal of Laws of 2019, item 1148, as amended), Art. 121a.

[8]Polish Quality Framework for Internships and Traineeships Information, Prepared by: Polish Human Resources Management Association, accessed: November 23, 2020, https://www.parp.gov.pl/storage/publications/pdf/1.%20polskie_ramy_jakosci_praktyk_i_stazy_informator.pdf

[9] Recommendation of the Council of the European Union of 10 March 2014 *on a quality framework for traineeships.* (OJ EU C 88 of 27/03/2014), accessed: 23/11/2020 https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:32014H0327(01) &from=DA

7.1. Organization of internships - formal and organizational requirements

The basis for verifying the implementation of formal and organizational requirements related to the organization of internships with employers are the following criteria:

1. Student internship program

The high educational value of the internship program is achieved by defining educational goals that are adequate to the business goals of the organization, the specific nature of the job and the profession. From the company's point of view, this is an essential element to further determine progress and assess the competency of the trainee.

The development, review and validation of an internship program for the profession of technician of renewable energy equipment and systems, adapted to the educational needs of the student (including people with disabilities) and the specific nature of work in a given company, is developed by a team of experts with professional experience related to the renewable energy industries and electricity and knowledge of the needs of the labor market in the field of professions included in the industry. The internship program takes into account the goals, content and responsibilities of the intern and takes into account the educational needs of students.

2. Student internship contracts

The prepared contract together with annexes constituting an integral part of the contract should be consulted and, if necessary, verified by a legal advisor and the project/task/internship manager.

The annexes to the contract are:

- Internship regulations.
- Individual internship schedule.
- Consent of the parent/legal guardian for the minor child's participation in a professional internship.
- Student internship journal – example.
- Internship completion certificates – template.

- Evaluation survey assessing the trainee's professional competences at entry/exit - example .
- Diagnostic questionnaire – trainee "Assessment of the quality of student internships" - example.
- Diagnostic questionnaire - employer ″ Assessment of the quality of student internships" - example.
- Diagnostic questionnaire - school ″ Assessment of the quality of student internships" - example.

The contract is prepared and signed by all parties involved in the student internship. It contains the details of the parties to the contract, the subject of the contract, the duration of the internship, the obligations of the parties to the contract, information on the intern's remuneration, if any, internship supervisors in enterprises, internship coordinators on behalf of the school, and ensuring compliance with the quality of internship implementation.

The document prepared in this form precisely defines the basis for implementing the program and obliges the parties involved to respect the written arrangements.

3. Individual internship schedule

The individual internship schedule and work plan should be prepared in accordance with the needs/skill level of students (verification tool - *Evaluation questionnaire for assessing the professional competences of the student-intern upon arrival/exit*), including students with disabilities. Schedule and internship plan must be compatible with the school curriculum. The internship has a carefully defined program and the level of its implementation is carefully monitored. Internship diaries should include daily reports on their progress. Each day, the internship supervisor's signature in the diary confirms the intern's presence at work and the professional tasks performed on a given day. At the end of the internship, the intern receives a certificate confirming the internship completed with a given employer.

The internship diary and the certificate of completion of the internship, completed and signed by the appropriate persons in the company, are the documents required to pay the scholarship to the intern.

4. Care and mentoring

Internship supervisors in enterprises are appointed at the stage of preparation for the implementation of internships. A person acting as an intern's supervisor should have predispositions to take on the role of a supervisor or mentor and have sufficient substantive knowledge about a separate organizational unit to provide reliable support to the internship participant.

Depending on the company's internal arrangements, the intern may be delegated to work with one or several people who will individually perform the tasks of a supervisor or mentor to a limited extent. Depending on the specific nature of the company, the supervisor receives remuneration or a training allowance after completing the internship, in accordance with the internship schedule.

5. Preparation of the workplace in the company

The employer is obliged to provide the conditions necessary for the trainee (including people with disabilities) to complete the internship program, in particular:

a) a training station equipped with the necessary devices, equipment, tools, materials and technical documentation taking into account safety and hygiene requirements,

b) rooms for storing clothes and shoes,

c) access to hygienic and sanitary facilities and social and living rooms.

7.2. Implementation of internships - assessment of the quality of support provided/substantive requirements

The employer is obliged, under the student internship contract, to *organize* the workplace and carry out the internship in accordance with the adopted program and schedule of the professional internship and in accordance with the best practices for ensuring the quality of practical education, ensuring occupational health and safety.

The intern takes part in free on-the-job training and training in the field of occupational health and safety and fire safety regulations. Is acquainted with the organization of work, work regulations, in particular with regard to compliance with work order and discipline, and other regulations in force at the place of professional internship.

The obligation to appoint a tutor for an apprenticeship or professional internship rests with the employer and results from a written agreement concluded between the employer, the project implementer and the student.

The internship supervisor participates in the following tasks: admitting the intern to the organization; carrying out all or part of the adaptation process; presenting the scope of responsibilities, explaining how to perform them; introducing the intern to the procedures and rules applicable in the organization; regularly monitors the intern's progress; provides feedback on the results achieved and the degree of task implementation, and provides ongoing substantive support in the scope of the internship program. The supervisor will monitor the progress and acquisition of new skills as well as the degree of implementation of educational content and goals. The internship supervisor confirms the intern's presence and completed tasks every day with his signature in the internship diary.

The employer assesses the intern's competences and issues a certificate of the completed internship, presenting information on the tasks performed and competences obtained as part of the internship, as well as on the practical skills acquired during the internship , as well as the degree to which the objectives and program of the internship have been achieved.

During the internship, the intern is obliged to timely and actively participate in the professional internship, carefully and conscientiously perform the activities and tasks included in the internship program, comply with the agreed duration of the internship and work regulations, occupational health and safety rules, fire protection regulations, and regulations on protection and secrecy. enterprises, personal data protection and the principles of social coexistence.

Before starting the internship, the student presents a current medical certificate confirming the lack of health contraindications to work in the profession.

In accidental situations resulting in the interruption or termination of the internship, it is permissible to pay the intern a stipend in proportion to the number of hours of the internship.

7.3. Research on the quality of student internships

The thematic scope of ensuring the quality of student internships presented above, which provides for a multilateral assessment of the quality of internships in terms of formal, organizational and substantive aspects, requires defining groups of survey respondents, which include: students training in the professions of renewable energy equipment and systems technicians, school representatives and representatives employers.

Research on the quality of preparation and implementation of student internships should be conducted using diagnostic questionnaires.

Sample thematic scope of research

- an internship program developed with the participation of representatives of employers and the school, taking into account the needs of students (including those with disabilities), goals, educational content, required equipment at the workplace - presented to the parties involved in the implementation of the internship,
- signed internship contract with annexes - providing interested parties with the content of these documents, rights and obligations,
- familiarizing students with the individual internship schedule, occupational health and safety regulations, fire safety regulations and workplace regulations,
- showing trainees their workplace,
- provided access to the intern to the necessary equipment, tools, materials and facilities to perform work,
- assessment/self-assessment of students' preparation for work in accordance with the internship program,
- designated internship supervisor and the scope of his/her activities in assessing the student's progress,
- assessment of the quality of the internship by the intern, representative of the employer and school,
- assessment of compliance of tasks performed during internships with students' skills,
- verification of receipt of a certificate of completed internship,

- verification of the scholarship payment to the intern ,
- involvement of the project management staff and their supervision over the implementation of internships,
- involvement of school coordinators in the course of internships.

8. Literature

1. Bolkowski S., *Elektrotechnika.* WSiP, 2008.
2. Bolkowski T., *Podstawy elektrotechniki*, WSiP, 2008.
3. Chwaleba A., Moeschke B., Płoszajski G., *Elektronika*, WSiP, 2008.
4. Chwaleba A., Poniński M., Siedlecki A., *Metrologia elektryczna*, WNT 2014.
5. Doległo M., *Podstawy elektrotechniki i elektroniki*. WSiP, Warszawa 2016.
6. Głocki W., *Układy cyfrowe,* WSiP 2008.
7. Goździaszek P., Mikołajczak A., *Montaż, uruchamianie i konserwacja urządzeń i systemów mechatronicznych. Podręcznik. Część 2*WSiP, Warszawa 2017.
8. Grabowski L., *Pracownia elektroniczna – układy elektroniczne*, WSiP, 2008.
9. Grygiel J., Bielawski A., *Podstawy elektrotechniki w praktyce,* 2017.
10. Grygiel J., Bielawski A., *Podstawy elektrotechniki w praktyce*, WSiP, 2017.
11. Grygiel J., Bielawski A., *Zbiór zadań, Podstawy elektrotechniki w praktyce*, WSiP, 2017.
12. Januszewski S., Pytlak A., Rosnowska-Nowaczyk M., Świątek H., *Energoelektronika,* WSiP 05/2004.
13. Januszewski S., Świątek H., Zymmer K., *Przyrządy energoelektroniczne i ich zastosowanie*, Wydawnictwo książkowe Instytutu Elektrotechniki, Warszawa 2008.
14. Mikołajczak A., *Obsługa urządzeń i systemów mechatronicznych cz. 1 i 2*, Warszawa 2016.
15. Parchański J., Miernictwo elektryczne i elektroniczne, WSiP, 2004.
16. Szczęch K., Bukała W., *Bezpieczeństwo i higiena pracy. Podręcznik do kształcenia zawodowego*. WSiP, Warszawa 2017.

Trade magazines:

1. „Wiadomości elektrotechniczne” – miesięcznik, Czasopismo Stowarzyszenia Elektryków Polskich (SEP) – SIGMA-NOT.

2. „Elektronika – konstrukcje, technologie, zastosowania” – Czasopismo Stowarzyszenia Elektryków Polskich (SEP) wydawane przy współpracy Komitetu Elektroniki i Telekomunikacji PAN.
3. Strzebońska A.: Doświadczenia polskiego sektora MŚP w zakresie organizacji programów praktyk i staży. Raport. PARP, Warszawa 2017.
4. Szenajch W.: Napęd i sterowanie automatyczne, PWN, Warszawa 2016.
5. Tąpolska A., Podstawy elektroniki. Podręcznik do nauki zawodów z branży elektronicznej, informatycznej i elektrycznej – część 1, WSiP Warszawa 2019.
6. Tokarz M., Sierny S., Dziurski., Montaż, uruchamianie i konserwacja urządzeń i systemów mechatronicznych – część I WSiP, Warszawa 2019.
7. Węsierski Ł., Podstawy pneumatyki, Festo Didactic.