RATIONALE FOR THE DEVELOPMENT OF THE INDUSTRIAL INTERNSHIP PROGRAM

Industrial internship is one of the most important components of the vocational education program, providing students with the opportunity to apply the knowledge and skills acquired in the educational environment under real working conditions. The rapid development of the renewable energy sector, the introduction of new technologies, and the increasing complexity of professional activities require students to be involved in real production processes during their studies and to become familiar with the technologies, work organization principles, and professional responsibilities applied in the industry.

The results of the surveys conducted within the framework of the REnForce project indicate that employers and industry professionals primarily value practical experience, the ability to solve technical problems, skills in working with technical documentation, competence in the operation and maintenance of equipment, and compliance with occupational health and safety requirements. At the same time, experts have noted that newly employed specialists often lack experience in real working environments, proficiency in using measuring instruments, equipment diagnostics skills, and practical experience in working with technical documentation.

International studies conducted in the field of renewable energy demonstrate that the role of a modern specialist is not limited to equipment installation alone. Professional activities include system preparation, installation, commissioning, operation, technical maintenance, monitoring, fault detection and troubleshooting, as well as the preparation and management of technical documentation. Therefore, in European vocational education systems, industrial internships are designed around the complete cycle of professional activities, ensuring the gradual integration of students into real professional processes.

The structure of the internship program has been developed in accordance with the principles of Competence-Based Education (CBE) and Work-Based Learning (WBL). The first stage of the internship focuses on familiarizing students with the working environment, occupational safety regulations, technical documentation, and preparatory activities. During the second stage, students participate in the installation of solar photovoltaic and solar thermal systems, while the third stage focuses on system operation, technical maintenance, monitoring, and fault diagnosis.

This structure ensures the sequential development of professional competencies, enabling students to progress from basic practical tasks to more complex and responsible professional functions. As a result, students develop competencies that meet the current demands of the renewable energy labor market and contribute to their effective professional performance.

The internship is assessed using a 10-point grading system, where scores of **4–6** are considered **Satisfactory**, **7–8** are **Good**, and **9–10** are **Excellent**. The assessment is carried out jointly by internship supervisors appointed by both the educational institution and the host organization. The main assessment components include the student's attendance, the quality and completeness

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of practical assignments, as well as the timely submission and successful defense of the internship report.

At the end of the internship, students complete a self-assessment form reflecting on the achievement of the internship learning outcomes.

Upon completion of the internship, students are able to apply and reinforce the theoretical knowledge acquired during their studies in real working conditions. Furthermore, direct interaction with the internship supervisor(s) assigned by the host organization facilitates employer-led mentoring and supports the development of professional competencies in an authentic workplace environment.

INTERNSHIP 1				
N	**Topic**	**Hours**	**Theoretical**	**Practical**
	Work area organization, safety and preparatory activities	**18**		**18**
1.	Structure and functions of organizations in the solar energy sector and principles of employees' labour rights in accordance with the Labour Code of the Republic of Armenia		**-**	**4**
2.	Principles of production process organization		**-**	**4**
3.	Application of personal protective equipment		**-**	**2**
4.	Application of basic electrical safety requirements			**2**
5.	Implementation of emergency response procedures		**-**	**2**
6.	Application of safety requirements for working at heights and on construction sites		**-**	**4**
	Skills in working with technical drawings, measurements and documentation	**18**		**18**
7.	Application of technical working drawings		**-**	**3**
8.	Application of electrical schematic reading skills		**-**	**3**
9.	Site orientation using cardinal directions		**-**	**3**
10.	Verification of drawing compliance with site conditions		**-**	**3**
11.	Site measurement and calculation of required materials		**-**	**3**
12.	Preparation of material lists, technical documentation and completion reports		**-**	**3**
	Fundamentals of using tools, equipment, design and monitoring software	**26**		**26**
13.	Application of hand and power tools in accordance with safety requirements		**-**	**6**
14.	Operation of electrical equipment in compliance with safety requirements		**-**	**8**
15.	Cable stripping, terminal installation and crimping using suitable tools		**-**	**4**
16.	Application of measuring instruments		**-**	**2**

17.	Application and configuration of monitoring software		-	**6**
	Installation and commissioning of grounding systems for solar power plants	**10**		**10**
18.	Layout and installation of the grounding system		-	3
19.	Installation and connection of grounding conductors		-	3
20.	Connection of the solar power plant metal structure to the grounding system		-	2
21.	Measurement and testing of the grounding system		-	2
	Total Number of Hours	**72**	**0**	**72**

INTERNSHIP 2				
N	**Topic**	**Hours**	**Theoretical**	**Practical**
	Installation of solar power plants and systems and implementation of construction preparatory works	**30**		**30**
1.	Marking out the installation area			6
2.	Positioning and marking of installation support points		-	6
3.	Preparation of foundations for support structures		-	6
4.	Preparation of materials, tools and equipment for installation works		-	6
5.	Preparation and installation of support structure components while ensuring occupational safety		-	6

	Skills in photovoltaic panel installation	**24**		**24**
6.	Technical inspection and dimensional verification of photovoltaic panels		**-**	**4**
7.	Assembly of photovoltaic panel mounting components		**-**	**8**
8.	Installation and fastening of photovoltaic panels		**-**	**4**
9.	Assembly and installation of the inverter mounting system		**-**	**4**
10.	Verification of the mechanical integrity of the main system components		**-**	**4**
	Skills in cable network installation	**20**		**20**
11.	Assembly and testing of DC electrical circuits		**-**	**4**
12.	Assembly and testing of AC electrical circuits		**-**	**4**
13.	Assembly of electrical circuits including switches, fuses and circuit breakers		**-**	**6**
14.	Connection of the inverter DC and AC circuits according to electrical schematics		**-**	**6**
	Skills in solar thermal system installation	**20**		**20**
15.	Installation of solar thermal collectors		**-**	**4**
16.	Assembly of water storage tank mounting components		**-**	**4**
17.	Assembly of the solar thermal system support structure		**-**	**4**
18.	Connection of the circulation pump, expansion vessel, control system and other auxiliary components		**-**	**8**
19.	Skills in quality control of installation works		-	4
	Basic skills in electric arc welding	**26**		**26**

20.	Preparation of welding equipment and selection of operating modes		-	4
21.	Selection and application of welding electrodes		-	3
22.	Execution of straight-line weld beads		-	6
23.	Welding of two metal components		-	7
24.	Welding of grounding strip and grounding rod		-	6
	Sales and Marketing Operations Skills	**20**		**20**
25.	Target Customer Identification and Market Segmentation		-	4
26.	Marketing Strategy Development and Planning		-	4
27.	Implementation of Market Entry and Positioning Strategies for New Solar Product		-	4
28.	Planning and Implementation of Marketing Communications (Advertising, Digital Marketing, and Sales Promotion Activites)		-	4
29.	Implementation of Customer Acquisition, Sales Presentation, and Sales Promotion Activities		-	4
	Total Number of Hours	**144**	**-**	**144**

INTERNSHIP 3				
N	**Topic**	**Hours**	**Theoretical**	**Practical**
	Skills in maintenance and repair of photovoltaic systems	**40**		**40**
1.	External inspection of the solar power plant and identification of defects		-	6
2.	Analysis of electrical schematics and identification of faulty sections		-	4
3.	Measurement of DC and AC parameters and identification of faults		-	4
4.	Identification and replacement of damaged grounding conductors		-	2
5.	Fault diagnosis using monitoring system data		-	4
6.	Cleaning of photovoltaic panel surfaces		**-**	**4**
7.	Inspection of mounting fasteners		**-**	**2**
8.	Inspection of cables and connections and replacement of damaged components		**-**	**4**
9.	Inspection and maintenance of inverter operating parameters		**-**	**6**
10.	Performing scheduled preventive maintenance of the solar power plant		**-**	**4**
	Skills in maintenance of solar thermal systems	**18**		**18**
11.	Cleaning and surface maintenance of solar thermal collectors		**-**	**4**
12.	Inspection of pipelines, thermal insulation and connections		**-**	**2**
13.	Diagnosis, dismantling, replacement, and restoration of circulation pump operation		**-**	**4**

14.	Inspection of the controller, temperature sensors and automation components		**-**	**4**
15.	Identification and restoration of physical damage to solar thermal system components		**-**	**4**
	Skills in maintenance of metal structures	**6**		**6**
16.	Detection of corrosion in metal structures of photovoltaic and solar thermal systems and implementation of anti-corrosion treatment.		-	4
17.	Restoration of damaged metal structures, repair of protective coatings, and assessment of work quality		-	2
	Technical report preparation skills	**8**		**8**
18.	Preparation of technical inspection and diagnostic reports for photovoltaic systems		**-**	**2**
19.	Preparation of technical inspection and diagnostic reports for solar thermal systems		**-**	**2**
20.	Preparation of maintenance and equipment replacement records		**-**	**2**
21.	Summarizing of completed work results and preparation of technical reports		**-**	**2**
	Total Number of Hours	**72**	**0**	**72**

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