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Go4VocationalSkills

Qualitative research – second round



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1 Introduction

In the period December 2023 - February 2024, the project team conducted individual in-depth interviews with vocational teachers and practitioners working in the fields of education selected in the project. The summary of the conducted qualitative research is presented in Table 1 and Figure 1.

The study was of a recall nature and its aim was primarily to find and explain possible changes in the preferred level of competences of graduates/employees in professions/positions adequate to the analyzed fields of education. Another aim of the study was to check what changes we can expect in the near future in relation to employers' expectations and requirements. We asked about what competencies will lose importance in the next 10 years and what will gain, what is the impact of modern technologies on competency requirements, and what professions within the analyzed fields of education will be particularly desirable in the future. The survey respondents were people with extensive professional experience and experts in their field.

Table 1 The number of interviews conducted with experts in the area of selected fields of study and countries

Field of study / country	Poland	Greece	Bulgaria	Spain	Total
construction technician	2	3	4	4	13
logistics technician	6	4	3	4	17
renewable energy technician	2	3	2	2	9
Total	10	10	9	10	39

Field of study / country	Poland	Greece	Bulgaria	Spain	Total
construction technician	2 (1+1)	3 (1+2)	4 (2+2)	4 (1+3)	13
logistics technician	6 (3+3)	4 (4+0)	3 (1+2)	4 (0+4)	17
renewable energy technician	2 (1+1)	3 (1+2)	2 (1+1)	2 (2+0)	9
Total	10	10	9	10	39

In brackets: teachers/ practitioners.

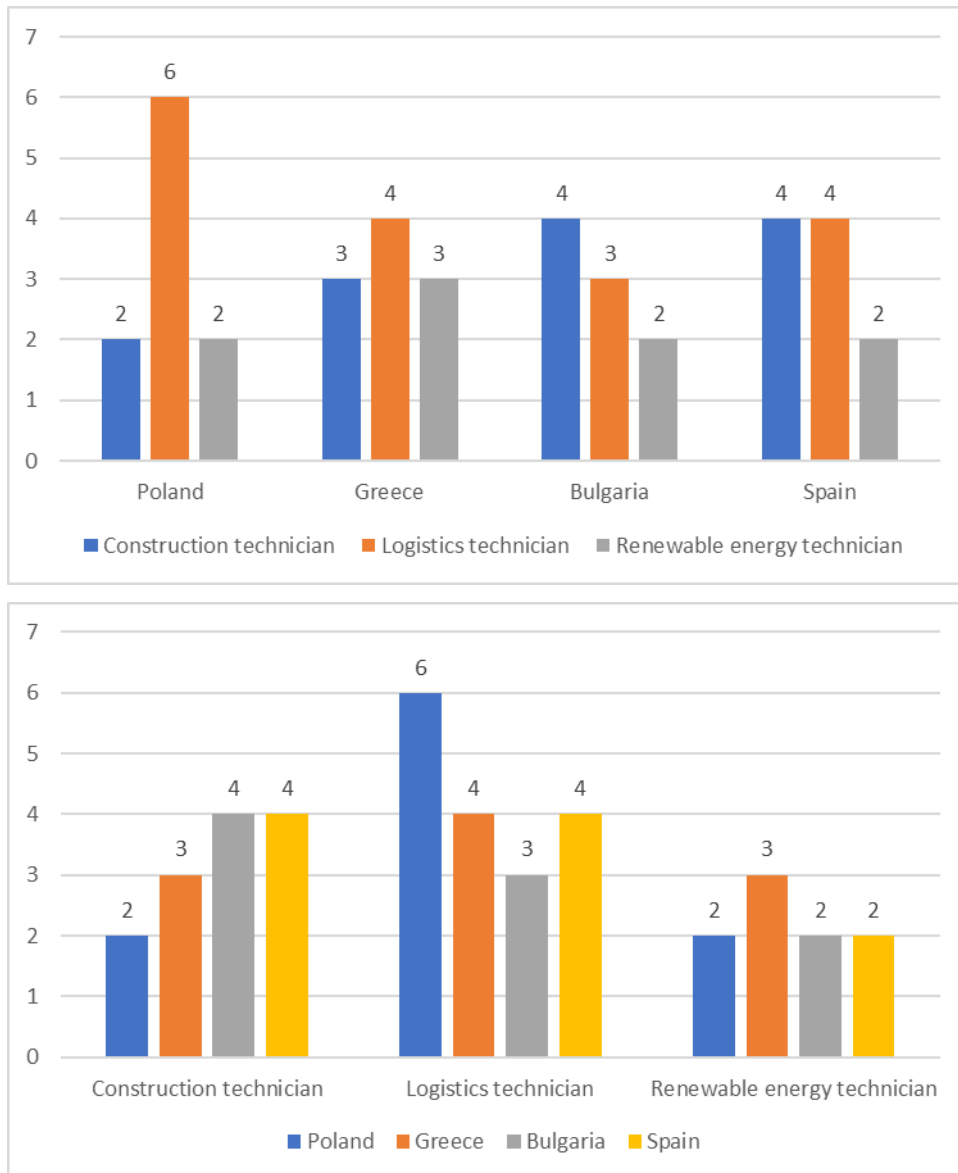


Figure 1 The number of interviews conducted with experts in the area of selected fields of study and countries

2 Field of study: construction technician

The importance of competences today and in the future: which will lose their importance, which will become more important (in 10 years).

Poland: The competences required from Construction graduates in terms of theoretical knowledge and practical skills will remain at the same level for the next 10 years, if there are any changes - they will be minor. The construction industry is developing and the demand for construction graduates is and will be very high. In terms of competences, there are and will be important theoretical foundations - it is important that technical school graduates enter the labor market with well-established theoretical knowledge, it would be ideal if they had internships (well conducted, the more internships - the better). New materials, techniques and technologies are constantly emerging in the industry, so it would be good if students were exposed to modern tools (e.g. levelers, lasers) and technologies at the place of study. From the employer's perspective, the willingness to learn, commitment, and sociability are very important - people with such competencies can be taught how to practice their profession already in the workplace.

In the future, IT-related competences will certainly be more important than today - knowledge of IT programs used in the industry, new methods for determining structures (level, theodolite). Competencies related to ecology will gain in importance (energy saving, pro-ecological technologies and materials, thermal insulation).

Spain: Few experts agreed that in addition to technological competencies, which experienced exponential acceleration, especially before, during, and post-pandemic, there is also another set of factors related to understanding and addressing the diversity of teams, multiple profiles, and multifunctional roles, something that was not as common before. *"Knowing how to work in a team, learning to communicate and negotiate are now fundamental skills for reaching agreements. Any company that wants to evolve needs to develop these socio-emotional competencies," emphasizes the specialist.*

Another participant pointed out also the importance of soft skills:

"We had been observing that in both the construction sector and other industries, there was a growing awareness, not so much for technical skills, but for another set of abilities related to digital and socio-emotional skills. Both are now differentiating factors in the activities of companies in our sector, as they make them more competent organizations."

One participant mentioned the importance of following competences for the future profiles: Occupational health and safety, driving vehicles, operation of construction machinery, lifting and auxiliary equipment, waste management.

Other competences more related to technical knowledge were related digital skills like: implementation of Integrated Project Delivery (IPD), Lean Construction, as well as the use of techniques such as Virtual Design and Construction (VDC), and Building Information Modeling (BIM).

Furthermore, a set of competences related to green transition was also mentioned: *In this context, decarbonization, directly related to ESG (Environmental, Social, and Governance) matters, is the major challenge in this sector, as in many others. It has become a central part of projects through a strategy that outlines a triangle: energy efficiency, reduction of waste materials, and more effective use of them.*

Bulgaria: According to the answers of the specialists, the skills that **will lose their importance** in the future are:

- Related to manual labour, since modern technologies are advancing rapidly in the sector, such as traditional drafting, drawing and writing

Those that will become **more important** are related to:

- using modern technologies, digital tools and even AI technologies. Those who can use modern technologies to control and also follow the process of work on a construction site.

Other skills, that might become more important, according to both groups:

- Adaptation and non-standard logical thinking and application in practical exercises. Workers in the sector of construction have to be adaptable to using new technologies and other IT tools, since in the past few years the practices have changed dramatically
- The practitioners both emphasized on the importance of Interdisciplinary Skills, where 1 person possesses knowledge and skills in different disciplines: architecture, engineering and more.

Greece: The experts from the industry agreed that traditional skills focusing on manual labour and straightforward construction methodologies are gradually becoming less critical. On the other hand, competencies in digital technologies, such as Building Information Modeling (BIM), are becoming increasingly important as well as skills in sustainable construction practices. Professionals with expertise in green building certifications, energy-efficient design, and renewable energy integration into construction projects are in high demand. The representative of the educational sector generally stated similar view on this topic highlighting the importance of advanced software for design (e.g., CAD tools), project management (e.g., BIM), and simulation of construction processes. It was also mentioned the value of soft skills such as problem-solving, teamwork, and communication since, according to the teacher, the construction sector's complexity requires professionals who can work collaboratively, navigate challenges creatively, and communicate effectively with diverse stakeholders.

The impact of technology development on the desired competences.

Poland: Rozwój technologii bardzo wpływa na pożądane kompetencje absolwentów budownictwa. Głównie w zakresie oprogramowania oraz wykorzystywanych urządzeń (teodolit, niwelator). Dobrze byłoby, gdyby programy nauczania nadążały za zmianami, a praktyki dawały możliwość ugruntowania wiedzy teoretycznej w praktyce.

Spain: All participants agreed that the impact of technological advances in the construction sector will have more and more importance. In this regard, it explains that an increasing number of companies are aware of the advantages and are committed to integrating technology into the design and development of their projects to identify areas for improvement and anticipate potential risks. In this way, they can also reduce costs and timelines while creating safer environments for their workers.

Another participant adds that, regarding the technological aspect, *construction professionals will have to face the challenge of incorporating the use of virtual reality, augmented reality, and artificial intelligence into their projects, as well as the materiality aspect of their projects, with the use of nanomaterials.*

Experts mention that the strategy is to offer cutting-edge technologies, much like a Big Tech, to make them equally appealing. Because it is essential to address supply chain disruptions and adjust prices for deliveries (so far only 50% manage to complete within the committed timelines). Therefore: virtual reality, machine learning, data analysis, 3D printers, or digital twins will be integrated into construction technologies and tools

Bulgaria: Modern technology was the main factor considered when analysing the change in importance of specific skills and job positions. It fosters a broader set of competencies related to data, collaboration, sustainability, and adaptability. Keeping pace with these advancements is essential for professionals to thrive in the industry.

Greece: BIM and CAD tools are transforming project management in the construction industry and require skills in specific software operation and the respective data analysis.

The term "competences of the future" and the preparation of graduates.

Poland: The competences of the future in construction are primarily universal competences: teamwork, analytical thinking, communication skills. Knowledge of foreign languages will also be important. It also includes soft skills, such as commitment, investing in your own development, curiosity about the industry, keeping up with news and changes, as well as practical skills.

Spain: In this aspect the most relevant competences for the future are related to the previous answers. Apart from the we can highlight also following comments:

"For the construction of new buildings, technical profiles proficient in new technologies will become essential. They need to master Building Information Modeling (BIM) for the 3D representation of buildings, for example, but also others who have an understanding of Big Data and, therefore, know how to interpret large amounts of data that can contribute to the construction of better homes.

When it comes to new generations also the following was mentioned:

Prefabricated construction is an attractive, economical, and fast-growing alternative that is increasingly attracting people, especially the younger generation. Therefore, it will be essential

to have professionals who master modelling, representation, and materials, at a time when sustainability is the overarching goal."

Bulgaria: Compilation of answers:

- Education that follows new requirements and technologies and introduces new practices in the learning process
- Modernization
- Communication
- Adaptation and non-standard logical thinking and application in practical exercises
- Programming and organizational skills

Greece: Technical advancements and specialization in construction software are the "competences of the future" and what is needed for acquiring them is updated curricula and training courses with the latest technological advancements and sustainability standards, essential for driving innovation and efficiency in Greece's construction projects. In addition to this, the teacher, pointed out the importance of increasing the attractiveness of the construction sector in VET and technical education, since it is a highly developing industry in Greece with a lot of opportunities for employment of young people.

Professions / positions for which will be high demand in the future (in 10 years).

Poland: In the future, there will still be a great demand for foremen, managers, cost estimators and workers (there is a labor shortage in the industry). In the future, there will be no new positions, the existing ones will remain the same, only new methods, technologies and software will appear.

Spain: One of the experts reinforces some of the profiles identified previously:

These roles cover a range of responsibilities within the construction and project management field, including contract management, technical oversight, group leadership, project management, and specific roles related to architectural design, BIM (Building Information Modeling), and MEP installations.

Furthermore, it seems like professionals who can implement improvements in the energy efficiency of homes will be needed. Because the future of construction will not only involve new buildings. Another participant adds that professionals in the field of engineering will be necessary, with knowledge of programming and devices, as home automation and smart homes will increasingly become a predominant trend. It will be logical to have architects with deep knowledge of structural calculations and new materials, also in a clear commitment to sustainability.

Finally, there is a growing expectation of employment for the profiles such as construction workers, responsible for tasks such as excavation, demolition, or masonry, and site foremen or supervisors.

Bulgaria:

- Industrial and civil engineers
- Geodesists
- Urban planners and designer
- Health and safety managers
- Architects

Mostly all the positions mentioned are in high demand currently.

Greece: Some of the future job positions that were mentioned from the experts are Sustainability Consultants, who can guide projects to meet green building standards, BIM Specialists, capable of leveraging digital tools for efficient project planning and execution and Digital Construction Managers, who can oversee projects using advanced technological tools for enhanced collaboration and efficiency.

The main challenges in preparing graduates for the professions / positions of the future.

Poland: Good preparation of students requires, above all, practice - professional internships should be longer and carried out in external companies (and not internally). The number of hours of theory should be reduced in favor of practice. A lot of practical classes on current devices, using current materials. Schools need to keep up with changes in the industry.

Spain: Participants had some interesting statements regarding this topic.

"They should be trained to provide sustainable solutions to all engineering projects, considering aspects of efficient management of natural resources to mitigate the impact of project implementation on the environment and enhance the well-being of society."

Other experts' comments that VET centres are not able to equip students with all the knowledge and probably some additional training more specific and related to individual needs of the company should be organized, such as *"Courses such as Construction Project Management, Operation and Maintenance Project Management, Strategic Contract Management, Lean Philosophy, Virtual Design and Construction (VDC), Leadership, among others,"* she comments.

Another expert launches the question "How to attract the best professionals?" Because many companies are immersed in finding the answer, making the job more appealing, especially for the new generations. He points out that for the new generation seems to be very important to find the balance between work and family life, offer interesting initiatives, having advanced technology (*"the metaverse is one of them, which can be used for training"*), and providing a purpose and career development within the company are some of the pursued maxims.

Bulgaria: Teachers need specific training in the new technologies used in the practice. The curriculum content should be stripped of everything that is outdated and no longer applicable to the profession. There should be better adaptation to the skills needed by the business sector. Practitioners focus more on the preparation and motivation of young people to work

and to learn. In their opinion, students lack some of the valued “soft skills” that they as employers are looking for, such as problem solving, autonomy and communication.

Greece: The experts from the construction industry agreed that a significant challenge in preparing graduates for future construction roles is ensuring their skills alignment with the rapidly evolving technological landscape and sustainability demands. The industry needs professionals proficient in digital tools like BIM and CAD and good knowledge in green construction practices. However, the educational system often fails to incorporate these cutting-edge technologies and sustainability concepts into its curriculum.

Moreover, it was highlighted from the educational expert that balancing technical skills with soft skills, such as problem-solving, collaboration, and adaptability, is essential but challenging in a conservative technical education environment. Preparing students for future job opportunities demands a holistic approach that includes hands-on experience with new technologies and an understanding of sustainable construction methods.

3 Field of study: logistics technician

The importance of competences today and in the future: which will lose their importance, which will become more important (in 10 years).

Poland: Teachers: Competencies that are certainly very important are: loyalty, learning ability, commitment, creativity. In the future, critical thinking, the ability to search for information and the ability to analyze it will also be important. Artificial intelligence will cause major changes in the competencies required in logistics. Artificial intelligence will be used for processes taking place in logistics companies. Big data and sustainable development will also be important. Logisticians will be required to:

- ability to analyze large data sets
- analytical skills
- communication skills
- resilience, resistance to what is happening outside and inside enterprises
- assertiveness (provided that arrogance is not assertiveness)

Competencies related to data analytics (data collection, use of various tools) and optimization will gain in importance. Due to globalization, language skills will be very important. None of the competencies that are important today will lose their importance (despite automation), or there will be less demand for drivers (when automatic vehicles are introduced).

Positions such as manual warehouse workers will lose importance.

Practitioners: In the logistics industry, the requirements for employees are increasing year by year. This is the result of high competition on the market, potential employees are faced with increasingly higher requirements and greater competences are required. Technological changes will cause some current positions (e.g. warehouse operator) to cease to exist because the people performing this work will be replaced by machines (an example from the industry: in one company, the introduction of 4 machines to the warehouse resulted in a reduction of employees from 100 to 40). Employees performing simple jobs will be eliminated. Employees in highly specialized positions, preferably combining competences and skills from several currently functioning positions, will gain in importance. Specialization in a specific, narrow section of logistics and very good education will be important. In the future, the importance of interpersonal skills will increase: contact, openness, teamwork, non-conflict, taking the initiative, independently looking for solutions to problems and not just reporting them. Over time, highly specialized knowledge of system operation will lose importance (this can be taught); analytical skills will be more important. Universal competences will certainly be more important than today. Over the next 10 years, changes in the competencies desired in the industry will result from the introduction of solutions using artificial intelligence. Universal competencies will be very important: the ability to work with people and support subordinate employees. I am observing a constant decline in the level of universal competences among young employees (especially after the pandemic), and more and more of them have mental

problems. In the next 10 years, some professions will probably disappear, e.g. people taking orders will be replaced by online systems, people planning routes will be replaced by computer systems optimizing routes (these already exist and are doing very well).

Spain: All participants agreed that digital competences are for sure the main group of competences to continue having the key importance in the future, together with soft skills.

"Great number of companies consider training in digital, cross-functional, and strategic management skills essential for their future competitiveness."

Some of the more specific competences mentioned, related to digital transition:

- Competences related to Automation and Robotics: Due to increased integration of automated technologies and robotics in warehouses and distribution centres to enhance efficiency and reduce costs.
- Competences related to Artificial Intelligence (AI) and Machine Learning (ML): Due to implementation of AI and ML-based solutions to enhance supply chain planning, predict demand, and optimize operations.
- Competences related to Blockchain: Utilization of blockchain technology to improve transparency and traceability in the supply chain, especially concerning the authenticity and security of products.

Apart from that, some of the participants were mentioning some other groups of more specific competences like:

- Competences related to Data Analytics: Due to intensive use of data analysis and Business Intelligence technologies to make informed decisions and optimize logistics operations.
- Competences related to Sustainability: Due to the growing focus on sustainable logistics practices, including carbon emissions reduction, route optimization to minimize environmental impact, and the use of eco-friendly packaging.

"Human resources teams must prepare to take the leap required to identify, attract, and retain new profiles. Additionally, they need to develop in their organizations the new skills and competencies associated with decarbonization and the digital transformation of the sector."

Finally, we can conclude that the most important competencies for the future are related to digital and green transition.

Less importance: When it comes to some competences that could lose importance, those were mostly related to Manual Data Entry and Basic Administrative Tasks as within the increased adoption of digital systems, there may be a diminishing need for manual data entry. Logistics professionals may find it more crucial to be proficient in handling automated processes.

Bulgaria: The respondents from both groups underscored the importance of embracing technological advancements, since it is already starting to change the labour sector. All

respondents understand that digitalisation is the biggest factor that is going to make some competencies less or more important in the future. Both practitioners emphasised on the growing significance of soft skills, also sustainability practices, and risk management strategies in the logistics sector.

The competences that the respondents mentioned will gain importance:

- Competences related to sustainability and green management of logistics
- Being able to use digital tools and even AI
- Competency to use digital supply chain management
- Soft skills like being able to adapt to change, problem solving, time management

In regards to the competencies that are going to lose importance, respondent mentioned that it is most probable to not need to know so much about warehouse storing, manual data entry.

Greece: All participants agreed that the main competences that will become more and more important in the future are digital and green skills. Use of advanced technologies and software, Blockchain technology and AI applications were some of the examples mentioned from the experts as the forward-looking skills that a future employee has to have in order to comply with the needs of the market and expand his/her career not only in Greece but all over the world. On the other hand, skills associated with manual logistics operations and straightforward customs procedures are becoming less significant. Instead, there is a rising demand for digital literacy, data analytics, and the ability to navigate international trade laws and digital customs platforms. As e-commerce continues to surge, competencies in online order fulfilment, digital customer service, and returns management are increasingly crucial. Additionally, with Greece's alignment to the European Green Deal, skills in sustainable logistics practices, such as implementing eco-friendly solutions and reducing carbon footprints, are becoming more valued. This shift underscores the need for professionals in the logistics sector to adapt to technological advancements, regulatory changes, and environmental considerations to remain relevant and competitive in the field.

The impact of technology development on the desired competences.

Poland: Teachers: The development of technology has a very large impact on the competences required in logistics. technologies make work easier and make it easier to find contacts and information. The development of technology will have a very large impact on the competences required in the logistics industry. This will be related, among other things, to the appearance of new industry software (CRM, ERP systems). Data analysis skills (high level knowledge of Excel) will be required. Thus, the development of technology will have an impact on the desired competencies - mainly analytical competencies.

Practitioners The development of technology has a huge impact on the industry (especially visible after the pandemic) and will cause some positions (the more basic ones) to disappear, and others (those difficult to replace by machines) will gain in importance. The development of technology has a significant impact on the competences desired in the industry: creativity

(creating automatic lines, automatic means of transport). Automation is a need that arouses great interest among employees. This applies primarily to software, in the near future there will be driverless vehicles and probably many other changes related to the use of artificial intelligence.

Spain: As already mentioned in the previous section, digitalization has a huge impact on the sector.

"For years, there has been a professionalization of the more technical profiles within the sector, as well as profiles linked to the technological aspect within logistics. The entire computerized tracking process has taken significant strides in recent years, in addition to the day-to-day procedures and the more commercial aspects."

In this aspect the main changes participants could identify are following:

Digitization of all logistics processes

"Worldwide, companies are embracing technologies such as warehouse management systems, tracking and tracing, supply chain automation, and more. The crown jewel is the smart warehouse, where information technology, automation, and data analysis converge to optimize every aspect of inventory management, from order processing to shipping."

Artificial Intelligence in Logistics

"Artificial intelligence is becoming a fundamental part of logistics. From trend prediction to task automation and calculating transport routes, AI is transforming the way we operate".

In the Warehouse the main changes are Automation and Robotics

"Robots are entering warehouses by leaps and bounds. Robotic automation, especially in intralogistics operations, is revolutionizing processes such as picking. This not only increases productivity but also reduces labor and operational costs."

Applications of the Industrial Metaverse in the Supply Chain

"The metaverse is conquering the supply chain and warehouses. This virtual environment is opening doors for remote collaboration, supply chain simulation, and training in a virtual world."

We can see that the impact of technology in the logistics industry is being quite significant and the changes emerging for sure are going to create the need for up-skilling of professionals in the field in these aspects. Participants also mentioned that it is not easy to keep up with the fast changes technology is bringing, both in the terms of financial investments and staff training.

Bulgaria: All of the respondents understand the importance of technology development for the future of job positions in the sector. Students should be trained in managing automated processes, also work with robotics and new digital storage systems. According to the practitioners the future jobs in logistics will probably require different set of competencies, specifically related to working with automation.

Greece: Competences such as data analysis, IT proficiency, digital tracking systems, and supply chain optimization have become crucial. Additionally, soft skills like adaptability and cross-functional collaboration are highly valued in this tech-driven industry. Moreover, Artificial Intelligence is becoming an integral part of the sector from task automation to transportation and supply chain management. Similarly, robotics has been a transformative force in the logistics industry, offering warehouse automation (e.g. Automated guided vehicles (AGVs), autonomous drones, order picking and material handling), improved accuracy, cost efficiency and customization based on the specific logistics needs of each company, making them adaptable to a variety of tasks and industries. Last but not least, a great focus was given on the importance of blockchain technology which on the one hand makes significant progress in customer management and order handling but on the other hand it was pointed out the large investment that requires from the company.

The term "competences of the future" and the preparation of graduates.

Poland: Teachers: The competences of the future are associated with artificial intelligence and technology. They require developing creativity and critical thinking skills. They are associated with teamwork, communication skills, and the ability to establish and develop contacts. The competencies of the future are: communication, the ability to cooperate in a team, broadly understood IT, the ability to prepare simple software without knowledge of code (no-code - methods of designing and designing applications using intuitive drag-and-drop tools that reduce or eliminate the need for traditional programmers who they write code). The competences of the future are versatility - the ability to take a broad view of processes. On the other hand, there will be a demand for very specialists in a very narrow field.

Practitioners: The competences of the future are primarily universal competences - willingness to learn, commitment, diligence. Professional competences can be acquired in the workplace. The competences of the future in the logistics industry include: resistance to stress, multitasking, ability to self-organize, ability to analyze data and solve problems, and conflict-free behavior.

Spain: Digital Literacy: It should be ensured that logistics education programs incorporate training on relevant digital tools and technologies.

Project Management: Very necessary to include project management courses and practical exercises in logistics programs.

Regulatory Knowledge: Provide comprehensive training on logistics regulations and compliance due to fast changes in the regulation procedures

Soft skills: Adaptability and Flexibility. It's very much needed to foster a mindset of adaptability through real-world case studies and exposure to dynamic logistics scenarios.

Cross-Cultural Communication: Promote international experiences and language courses to enhance cross-cultural communication skills.

All participants recognized the importance of not only adaptation of the educational system but also to foster on board company trainings, both for initial and continuous training:

"The medium and long-term competitiveness of companies throughout the supply chain is conditioned by their ability to transform in a dual sense: on the one hand, enhancing their process of digitization and technological adoption, and on the other hand, incorporating or developing the talent necessary to carry it out. Investing in training translates into a greater ability to attract talent, retain current teams, and, in this talent scarcity environment, into companies that are more prepared to compete."

"Fortunately, nowadays, education and training should not only take place in classrooms but also within companies, seeking and finding new ways to facilitate training while on the job. This never happens by chance; we must create new training models and invest in the development of processes and information tools applicable to on-the-job learning. We need to take action on the challenges and obstacles that await both professionals and their organizations."

Bulgaria: Overall, all the competencies of the future are related to the use of new digital tools, but also problem solving and risk management. All of the mentioned competencies are as follow:

- Soft skills like: adaptiveness, problem solving
- Working with robotics
- Technological literacy
- Resilience and Risk Management
- Knowledge on sustainability practices
- Innovation and Creativity

Greece: Again, the experts agreed on the following “competences of the future” that are essential for entering the labor market:

- Digital literacy has become indispensable. With the advent of technologies such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain, logistics operations are becoming increasingly sophisticated. Graduates must therefore be equipped with not only the basic understanding of these technologies but also with the skills to apply them in optimizing supply chain processes.
- Green Skills. Greece's logistics sector, similarly to global trends, is moving towards greener operations to minimize environmental impact. Graduates must understand sustainable logistics practices and be able to implement strategies that reduce carbon footprints and improve energy efficiency.
- Soft skills such as problem-solving, adaptability, and communication are becoming equally important. The dynamic nature of global supply chains requires professionals who can navigate uncertainty, collaborate across cultures, and lead with agility.

In order to achieve all the above, students have to come in contact with advanced companies in order to take some hands-on experience and even try to do their internships above. Certainly, the updated curricula offered in the school and the opportunities offered for participating in workshops and debates with sectoral representatives, is also a vital element.

Professions / positions for which will be high demand in the future (in 10 years).

Poland: Teachers: In 10 years, there will (still be) a great demand for warehouse workers and forwarders, and people responsible for logistics management will be needed. There will be new positions - e.g. related to the use of drones in logistics. Generally, the emergence of new positions will result from the development of technology. There will be a great demand for global supply chain management specialists and purchasing specialists. Some companies, for financial reasons, will not employ specialists and will instead outsource to specialized companies. New professions will certainly appear - their creation will be related to the development of new technologies (artificial intelligence). There will be a great demand for planners and purchasing specialists. New positions related to technology development will certainly be created, but it is difficult to name them at the moment.

Practitioners There will be new professions that will combine several current positions into one. In the future, management positions will be in high demand, but managers of the future will also be team coaches, leaders who will be able to pull the team along. Certainly, in the future there will be new positions related to, for example, conducting warehouse automation projects. Specialists in narrow areas will be needed - not a purchasing specialist, but, for example, a packaging purchasing specialist. There will certainly be a demand for forwarders (but in the perspective of e.g. 15 years - not necessarily, automation will mean that there will be less demand for forwarders). There will still be a demand for specialists and basic professions (those in which humans cannot be replaced by machines). If new professions appear, they will be those related to the configuration and use of new systems, e.g. for route planning.

Spain: One of the participants pointed out that in 2023 some of the most wanted job positions were Delivery Vehicle Driver with more than 100.000 vacancies as well as Warehouse Worker with similar numbers of vacancies. Seems like those 2 positions are currently most difficult to find and for that reason he believes will be very much requested in following years. Apart from that, participants reinforced the profiles identified in the previous years, such as logistic specialist or Operations manager, Procurement specialists and demand planners,

"It is a trend that has been increasing over the past few years. The entire logistics chain itself has become highly professionalized, and one must also consider the growing importance of e-commerce and online demand.";

But also some other new profiles such as Supply chain directors, technical buyers or some of the profiles related to green transition like Specialist in sustainable mobility, logistics emission specialist or sustainability logistic technicians.

On the other hand, the expert indicates that the demand for purchasing profiles is partly derived from *“something we are all witnessing and experiencing, which is the increase in the cost of the entire final product, even extending to earlier stages of the supply chain; in raw materials. These profiles contribute to the company's ability or skills to directly reduce the impact on the financial statements from the purchase of raw materials, especially when we talk about more technical buyers. In this case, we see significant added value in the search for new suppliers or products for the manufacturing process.”*.

Bulgaria: All of the positions mentioned by the respondents are the following:

- Supply Chain Planners
 - Transportation Managers (sustainable transportation managers)
 - Logistics consultant
 - Return logistics specialist
 - Warehouse Automation Specialists
 - stock accountants
 - import-export officers
- Mostly all the positions mentioned are in high demand currently.

Greece: From the educational side, the teachers believe that the most important professions that will be in high demand in the future are Supply Chain Analysts, mainly because of Greece’s strategic position as a logistics hub in the Eastern Mediterranean, the ability to analyse and improve logistics and supply chain processes using data analytics and predictive modelling will be highly valued. Also, Logistics Software Managers will see increased demand since the digitization of supply chains and the adoption of technologies such as the Internet of Things (IoT), blockchain, and artificial intelligence (AI) in logistics operations need professionals who can manage and integrate these technologies to improve efficiency and reduce costs. Sustainability Managers in Mobility and Transportation in logistics are becoming increasingly important as companies strive to reduce their environmental impact. This is particularly relevant in Greece, where the logistics sector is under pressure to adopt greener practices. Finally, one expert mentioned that with Greece's e-commerce market expanding, professionals who can manage the complexities of online orders, including warehousing, distribution, and last-mile delivery, will be in high demand offering plenty of open spaces for E-commerce Logistics Specialists.

The main challenges in preparing graduates for the professions / positions of the future.

Poland: Teachers: The need to "slim down" the scope of theoretical knowledge, not duplicating the same scope of knowledge in several subjects. The need to increase the number of practical classes and job shadowing. Schools should have better equipped laboratories (computers, access to software used in logistics). During learning, it is necessary to combine theoretical knowledge with practice (including inviting practitioners to classes). It is necessary to learn data analysis. The ability to operate IT systems used in the industry is important. Games based on the realities of work in the industry should be used in the teaching process.

Problems faced by educational institutions include obtaining software (programming companies do not want to provide free licenses), especially software with ready-made databases (ready for exercises, without the need for time-consuming data entry into the system). The main challenges for education are providing appropriately qualified staff to conduct classes at an appropriately high level. Programs such as "Top Young" run by practitioners and dedicated to the best students are very useful. It is necessary to encourage students (develop the habit) of continuous learning and improving qualifications.

Practitioners: Keeping up with technological changes, educating specialists in narrow fields, developing habits, the need for continuous learning, curiosity about what is happening in the industry. The need to introduce (or increase the number of) reference meetings in logistics companies. Thanks to such visits, students will be able to learn about real job positions and what is required in such positions. Practice – first of all; companies are up to date with the market and the demand for employees. Curricula should keep pace with the labor market. Schools educating logistics technicians should introduce classes that develop analytical skills (data analysis and drawing conclusions), problem-solving skills, and cost analysis skills (profitability is very important, and the transport industry operates on low margins). The ability to use computer applications dedicated to the industry and the development of good self-organization skills are also important. Practices are necessary because, for example, in schools there are very few issues related to passenger transport, and it has its own regulations.

Spain: Some participants mention that the companies no longer focus so much on technical competences per se; they emphasize more on soft skills or interpersonal skills, therefore the educational institutions should be more focused on developing transversal skills. On the other hand, other participants pointed out the importance of digital upskilling, not only for the students for the future positions but also for the current workers. They admit that not always is possible to equip students with all competences, therefore the companies here also have a big role:

"We do not have the capacity to constantly hire and fire professionals to bridge the gap in new technology. Instead, we can periodically upskill our professionals through internal or external training to provide them with the new skills and distinctive competencies they need in this field."

Bulgaria: Overall, the respondents from the Practitioners group focused on the soft skills factor as a very lacking area of preparation for the younger generation. The school system is lacking the possibility to properly assess and develop the analytical thinking of their students, which results in a challenge for the employers. According to teachers, the rapid technological advances are challenging the education system to keep track of the newest updates and modern technological tools and systems.

Greece: The experts pointed out that the challenges are not addressed to the future graduates but to the VET System. More specifically, they expressed their concerns about the provision of the essential equipment and laboratories responding the digital skills and tools required.

Not all the schools (public or private) have the opportunity to offer this kind of services in their students and this leads to poor contact of the students with advanced technologies. Also, it was pointed out the difficulty to “green” the already established curricula covering the needs of the labor market. It is not an easy mechanism to totally update and change a training program in Greece. In terms of students, they believe that the main challenge is to “teach” them the soft skills mentioned above. The experts believe that soft skills can only be acquired through hand-on experience and the opportunities are limited at this moment in Greece.

4 Fields of study: renewable energy technician

The importance of competences today and in the future: which will lose their importance, which will become more important (in 10 years).

Poland: Renewable energy is a very volatile area, you need to keep up with these changes. According to the respondent, none of the competencies currently valued on the labor market will lose their value in the coming years. At most, the requirements of the labor market will continue to evolve and become more and more stringent. Renewable energy is a dynamically developing industry, it is necessary to track these changes and keep up with them. The key competence is the willingness to constantly learn and update one's competences. Language skills are and will be very important (many training courses and materials are prepared in English, teams often consist of people from different countries or carry out orders abroad). The ability to work in a team (including an intercultural team) and the ability to adapt to changing conditions will be important.

Spain: One of the participants mentioned that Solar energy, in particular, is undergoing significant advancements as innovations in photovoltaic technology drive increased efficiency and affordability of solar panels. Wind energy is undergoing a transformation with the development of more efficient turbines. All this will have the impact on the area of competences to be trained for the experts. Apart from that, once again the most important role is associated with digital skills. Experts mention that with technical and soft skills certified in Programming Language, Cloud Computing Services, and Application Programming Interface (API), personnel from the construction of the plants are required to add to their operation and maintenance practice. Similarly, technicians in smart grids, storage, and batteries are needed in the field. Furthermore, new competences should be linked to construction tasks such as energy rehabilitation and adapting infrastructures to conscious consumption, integrating renewable energies and smart devices. Relevant training includes industrial design, architecture, electrical, civil, and mechanical engineering. They should possess knowledge of Autocad, Autodesk Revit, BIM, virtual simulations, MS Office, PLC, among others.

Bulgaria: With both participants we discussed that there is a high probability that the basic manual labour roles may decline in importance due to automation, but in general for all sectors, not just the RE. It was mentioned that the RE sector hasn't been fully developed and it is gradually evolving in Bulgaria, all together with the important skills a person working in the sector should have.

Competencies that both participants mentioned as very important for this sector are:

- Knowledge on sustainability and environmental awareness
- Competency to use digital systems like AutoCAD and other software
- Engineering skills

In the opinion of the practitioner, the skills related to adaptability and problem-solving will become even more important in the future, taking into consideration the rapid changes in the sector.

Greece: As the renewable energy sector continues to evolve, particularly in Greece, the landscape of required competencies is also undergoing significant changes. According to both interviewees from Group 2, the importance of technical skills specific to renewable technologies, such as solar and wind energy engineering, is on the rise. These skills are critical for designing, implementing, and maintaining renewable energy systems. Moreover, expertise in energy storage technologies, such as battery storage and hydrogen, is becoming increasingly important as Greece moves towards stabilizing its renewable energy output and enhancing grid reliability. On the other hand, competencies related to traditional fossil fuel energy systems are gradually losing their importance. As Greece commits to reducing its carbon footprint and enhancing its renewable energy capacity—evidenced by the ambitious target to achieve climate neutrality by 2050—skills associated with coal, oil, and natural gas extraction and processing are becoming less relevant.

The impact of technology development on the desired competences.

Poland: Technology development in the industry is very dynamic. There is a huge difference from year to year. You have to keep up with them. The development of technology has a major impact on the required competencies - the appearance of new devices and technologies requires employees to have language skills (interfaces are most often in English), the ability to learn quickly, and general proficiency in using software.

Spain: The same like in the first question.

Bulgaria: Both respondents agreed that the technological advances will have a big impact on the desired competencies for renewable energy professionals. Even now, according to them, the development of technology is crucial to this sector and professionals working in RE have to always adapt to changes and updates in technology.

Greece: One of the participants highlighted that digital skills, including data analysis and cybersecurity for energy systems, are gaining prominence. The integration of renewable energy sources into the national grid requires specialized data management and protection against cyber threats, highlighting the growing need for professionals equipped with these competencies.

Interviewee from the educational sector, gave the example of the integration of smart grids and the application of Internet of Things (IoT) technologies for monitoring and managing renewable energy production which demand a workforce proficient in digital skills, including IoT management, machine learning for predictive maintenance, and blockchain for energy transactions.

Furthermore, all participants agreed that the emergence of more efficient and less costly renewable energy technologies, such as improved photovoltaic systems and wind turbines,

requires engineers and technicians with up-to-date knowledge on the latest technological innovations. This ensures that renewable energy projects are designed, implemented, and operated efficiently, maximizing energy output and minimizing costs.

The term "competences of the future" and the preparation of graduates.

Poland: Standardization, i.e. combining energy from different sources, will certainly be important. Universal competencies will certainly be more important (professional ones can be learned). Competencies of the future include the ability to adapt to changing conditions, the ability to work in a group and language competences. In terms of professional competences - the industry is changing so quickly (mainly when it comes to technologies) that constant improvement, willingness to constantly improve knowledge, and curiosity about what appears on the market are necessary.

Spain: Experts had different opinions about the competences of the future graduates. One of them mentioned that it is important to consider that this sector is still taking shape, so new qualifications will continue to emerge, some of which may not even exist yet. "There are careers that have not been invented yet for green employment, but the job market is very significant. An example of this is the profiles related to sustainability. The position of sustainability consultant is the fifth job with the greatest placement opportunities. In this context, the education and the industry will have to work together to fill in these gaps as quickly as possible. If educational systems and companies do not train individuals in these skills, the shortage of competencies and talent will be a barrier in shaping a more sustainable energy system. Therefore, it recommends that administrations strengthen ties between educational institutions and the labor market. It is also necessary to update the educational offerings, promote cross-cutting skills in studies, advance in the challenge of STEM education, and advocate for quality and innovative Vocational Training, among other measures.

Another participant claims that as for cross-cutting skills, the most valued one is the ability to work in a team: the need for candidates to collaborate with colleagues, interact, and pursue common goals. Apart from that, mentioned that other soft skills required in the majority of job offers in the energy sector include the ability to set priorities and execute tasks and effective communication. Among the main skill deficiencies of graduates in the energy sector, experts highlight a lack of digital, linguistic, and communication skills.

Bulgaria: The respondents find it hard to define what will be more important in the future. Both mention that in their opinion competencies related to working with software's and other digital systems will be of high value. In the opinion of the practitioner, in this sector is hard to predict the technological advances, since it's modern sector. Here are the mentioned competencies of the future, according to the participants from both sectors:

- sustainability and environmental awareness
- adaptability and innovation
- engineering knowledge

— work with software: AutoCAD, BIM, Python, ArcGis and others

Greece: On the one side, the teacher, mentioned that they see the "competences of the future" as a dynamic set of skills that evolve with technological advancements and societal needs. The educational approach must therefore be forward-thinking, integrating core principles of electrical engineering with specialized knowledge in renewable energy systems, such as solar, wind, and hydroelectric power generation. Given Greece's strategic initiatives for renewable energy, such as the emphasis on solar energy through projects like "Helios," it's crucial for our graduates to be proficient in these technologies. For example, in order to prepare the students as much as possible for the labour market, they are incorporating courses on smart grid technologies, energy storage solutions, and digital simulation tools into the curriculum. These courses are designed to provide students with hands-on experience in designing and managing renewable energy systems.

From the labour market perspective (practitioner), it's essential that graduates not only possess a solid foundation in renewable energy technologies but also exhibit skills in digital tools, data analytics, and cybersecurity. With Greece's commitment to expanding its renewable energy capacity, such as through the development of large-scale solar power projects and investments in wind energy, the demand for professionals who can navigate the complexities of modern energy systems is more that important. In this context, there is an urgent need for further collaboration and communication between the industry and the educational sector, through internships, national/European programs, and project-based learning opportunities that expose students to real-world challenges.

Professions / positions for which will be high demand in the future (in 10 years).

Poland: There will certainly be a great demand for assemblers, installers and post-production support staff. There is already a shortage of such workers. There will certainly be new positions in the future (it is difficult to determine their names now), but they will be related to the chemical industry. In the future, there will be a need for the same competences as today. Knowledge of various technologies and operating procedures will become more important. It is difficult to predict what specific competencies in this area the market will expect, which is why competencies in terms of the willingness to constantly improve and supplement qualifications are so important.

Spain: Experts mention that the new technological scenario that is emerging will enhance the need for new profiles such as renewable energy project technicians, specialists in electrical networks in wind farms, experts in photovoltaic systems, design engineers, or specialists in energy supply contracts. In the field of sustainable building and rehabilitation, new professions are taking shape, including installers of advanced technological solutions or information modelling managers for building construction; specialists in deep building renovation; and energy auditors and managers. One of the experts claims that Spain is at the forefront of renewable energies, especially solar and wind energy. Profiles such as renewable energy engineers, maintenance technicians, or sustainability specialists will be in demand.

When it comes to the green transition, experts mentioned some of the following profiles: New green occupations are emerging, such as operators of clean energy plants, technicians in biofuels, biomass, geothermal, methane capture systems, and hydrogen. Professions related to energy efficiency are also on the rise, including auditors of environmental systems and processes.

Bulgaria: According to the respondents, the positions that are in high demand now will continue to be in demand in the future, without specific differences.

- renewable energy systems engineer
- Installers
- data analyst/renewable energy analyst
- renewable energy project developer
- energy storage specialist
- sustainability specialist.

Greece: Both practitioners agreed that the new job positions that will be in high demand the upcoming decade will be professions such as Renewable Energy System Engineers, particularly those specializing in solar and wind technologies. Additionally, with the integration of renewable sources into the national grid, the demand for Energy Storage Specialists and Smart Grid Technologists is set to rise. Finally, Data Scientists and Analysts with expertise in renewable energy applications will be increasingly demanded.

The electrical engineer teacher highlighted that there will be an increased demand for graduates equipped with specific competencies in renewable energy technologies such as Electrical Engineers with a specialization in renewable energy sources, such as photovoltaics and wind energy. Additionally, it was mentioned the emerging need for experts in Cybersecurity and Systems Integration aiming to protect the integrity and reliability of energy infrastructure from cyber threats, and ensuring seamless integration of various renewable sources into the grid.

The main challenges in preparing graduates for the professions / positions of the future.

Poland: It is necessary to ensure that laboratories in schools are adapted to the needs of the labor market (e.g. equipping laboratories with teaching aids for heat pumps, wind simulators, etc.). Great emphasis on the practical aspect and observing the labor market and the needs reported by employers.

Spain: One of the participants highlights that in Spain currently we are facing a big lack of the profiles in this sector, which is something to be solved in the future. Education must attract the talent and train students in the field in order to cover those gaps. Another participant raises the discussion about the competence recognition in the sector, which would also allow to up-skill some of the professionals with experience which could contribute to covering those missing positions. *“However, the training offerings targeted at this sector are currently low or*

very low, so it is also possible to practise this profession with a recognized "professional competence acquired through work experience or non-formal training."

Bulgaria: The challenges that were mentioned include the constant need to upgrade the studying curricula, educational programs often focus on specific disciplines and usually are unable to properly provide the students with knowledge on software and digital instruments and systems. Another important challenge that was mentioned is the disconnect between the industry and the education system, which is creating a mismatch of skills and expectations.

Greece: All participants pointed out that the main challenge for preparing the graduated for the future professions is mainly the acquisition of practical skills during the education and bridging the gap between academic training and the practical implementation in the industry. This gap means that graduates often enter the workforce needing more practical experience and familiarity with the latest technologies in solar, wind, and energy storage solutions. Specifically, it was mentioned that the renewable energy sector in Greece faces regulatory and financial challenges, impacting project development and execution and for this reason graduates must be prepared to navigate these complexities, requiring a blend of technical skills, flexibility, and problem-solving abilities that are difficult to be acquired in a traditional educational setting.

Practical experience is crucial for understanding the complexities of designing, implementing, and managing renewable energy systems. However, gaining access to real-world projects, state-of-the-art laboratories, and industry-standard software tools can be resource-intensive and logistically challenging, mainly when we talk about public training centres.

5 Competency profiles – analysis of changes

5.1 Field of study: construction technician

Analyzed positions and number of respondents who defined the current desired level of competences:

P1: Foreman/junior site manager – 9 respondents (2PL, 3ES, 1BG, 3GR)

P2: Construction technician – 5 respondents (1PL, 1ES, 2BG, 1GR)

P3: Project designer- junior/draughtsman – 7 respondents (2ES, 3BG, 2GR)

P4: Technician in geodesy – 1 respondent (1BG)

P5: Cost estimator – 6 respondents (1PL, 2ES, 1BG, 2GR)

Competency level for the position P1: Foreman/junior site manager

The analysis of competency levels for the profession was performed by 9 respondents. The changes concerned both increasing and lowering the required level.

The changes considered are marked in red font.

Increasing the level of competence for:

- *Personal – capacity of resilience (e.g. for stress, time pressure)* – the need to change level 3 to 4 was reported by five out of nine respondents. The justification included information about stress factors occurring in this position, i.e. responsibility for subordinate construction workers, for the progress of work on the construction site, occurrence of problem situations (e.g. weather variability), work under time pressure.
- *IT – software literacy* – an increase in the level of required competences (from 3 to 4) was reported by two respondents, justifying it with digital progress in the construction industry.
- *Interpersonal – communication, teamwork* – two people reported the need to increase the level (from 3 to 4) of competences, justifying the highest level with the need to communicate both with clients and team members.
- *Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)* – two people proposed changing the level from 3 to 4 in justification, stating that the analyzed position requires cultural understanding and the ability to identify various needs.
- *Personal – loyalty, involvement, responsibility* – according to one respondent, the level of competence should be increased from 3 to 4, because customer trust and employee satisfaction depend on this competence.

Lowering the level of competence for:

- *Creativity – generating new ideas, creative style of work* – lowering the level from 3 to 2 was suggested by one person, stating in justification that the work is repetitive and does not require such a high level of creativity.

- *Personal – capacity of resilience (e.g. for stress, time pressure)* – one person decided that the level of this competence should be reduced from level 3 to level 2, justifying it by the fact that all responsibility is borne by the boss, and therefore work on it position is not stressful.
- *IT – software literacy* – one of the respondents proposed lowering the level of this competence to 2, stating in justification that knowledge of IT technology is not important in this profession.

Competency level for the position P2: Construction technician

The analysis of competency levels for the profession was performed by 5 respondents.

The changes considered are marked in red font.

The changes mainly concerned increasing the level of required competences for:

- *Vocational - practical skills* – a change from level 3 to 4 proposed by two out of five respondents with the justification that these competencies are very important in this position.
- *Personal – loyalty, involvement, responsibility* – a change from level 3 to 4 proposed by two respondents with the justification that these competences are of great importance when taking responsibility for the entrusted tasks.
- *Learning - openness to lifelong development* – a change from level 3 to 4 proposed by one research participant with the justification that a person working in this position must be interested in what is happening in his industry, update his knowledge and be curious, because the knowledge gained at school is not enough.
- *Analytical – problem-solving skills* – changing the level from 2 to 4 proposed by one research participant with the justification that problems often arise in this profession, a person in this position must be able to solve them on an ongoing basis so that there are no downtimes at work.

Proposals to lower the level of required competences concerned:

- *Vocational – theoretical knowledge* – lowering the level from 3 to 2 was suggested by one person, justifying it with the fact that in this profession, practical professional competences are more important than theoretical ones.
- *IT – software literacy* - lowering the level from 3 to 2 was proposed by one person, stating in justification that basic knowledge of IT issues is sufficient for this position.
- *Creativity – generating new ideas, creative style of work* – lowering the level from 3 to 2 was suggested by one person, claiming that in this position creativity is not as important as, for example, in the case of a designer.

Competency level for the position P3: Project designer- junior/draughtsman

The analysis of competency levels for the profession was performed by 7 respondents.

The changes considered are marked in red font.

Also in the case of this position, most of the changes proposed by respondents concerned increasing the level of required competences:

- *Creativity – generating new ideas, creative style of work* – increasing the level from 3 to 4 was suggested by three out of seven respondents. The justification stated that creativity is key in design positions, designers and draftsmen must have a vision of creating a drawing and a certain amount of imagination.
- *Language – knowledge of foreign languages* – increasing the level from 2 to 3 was suggested by three respondents. The justification stated the need for clear and effective communication (verbal and written) to convey design ideas and collaborate with team members or clients, as well as the need to use English when using specialized software.
- *Vocational – theoretical knowledge* – increasing the level from 3 to 4 was proposed by two respondents, stating in justification that the implementation of tasks in this position requires a solid theoretical foundation.
- *Vocational - practical skills* – increasing the level from 3 to 4 was proposed by one study participant, stating in justification that a person employed in this position should be proficient in technical drawing, reading projects, knowledge of construction regulations and standards, design principles, and documentation management.

Proposals to lower the level of required competences concerned:

- *Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)* – reducing the level from 4 to 3 was proposed by three out of seven study participants in justification, stating that this position can be independent, and if it requires working in a team, the team is not diverse, and Teamwork is not an important element of work.
- *Interpersonal - communication, teamwork* – reducing the level from 4 to 3 was proposed by one person, justifying that the designer can work independently.

Competency level for the position P4: Technician in geodesy

The analysis of competency levels for the profession was performed by 1 respondent.

The changes considered are marked in red font.

The proposed changes concerned increasing the level of competences:

- *IT – software literacy* – change from level 3 to 4, justified by the constant increase in the importance of IT in the construction industry.
- *Language – knowledge of foreign languages* – changing the level from 2 to 3, stating in the justification that knowledge of English is necessary to operate the software used in this position.
- *Analytical – problem-solving skills* – change of level from 3 to 4.
- *Organization and self-organization* – time management, self-reliance - change of level from 3 to 4, the justification states that this profession involves the use of various technological instruments that are developing rapidly.

Competency level for the position P5: Cost estimator

The analysis of competency levels for the profession was performed by 6 respondents.

The changes considered are marked in red font.

Almost all the proposed changes concerned increasing the originally assumed level of competences:

- *Vocational – theoretical knowledge* – changing the level from 3 to 4 was proposed by two people, justifying it with the need to have a good understanding and knowledge of the theoretical part (mathematics, quantitative analysis, risk management, reading and analyzing plans).
- *Language – knowledge of foreign languages* – a change from level 1 to 2 was reported by two people, justifying it with the need to know industry technical terms in English (e.g. to operate English-language applications).
- *Vocational - practical skills* – changing the level from 3 to 4 was suggested by one person, in justification pointing to specific practical skills: costing of materials and labor, project management skills.
- *IT - software literacy* – changing the level from 3 to 4 was suggested by one person, justifying that currently, in the profession of a cost estimator, knowledge of software (Norma Pro, Norma Expert) is very important - these are the basic work tools.
- *Analytical – problem-solving skills* – the change from level 3 to 4 was reported by one person, stating in justification that a person in this position must quickly and rationally analyze data.
- *Creativity – generating new ideas, creative style of work* – changing the level from 2 to 3 was suggested by one person, justifying that a cost estimator should have a fairly high level of creativity, including: should be able to suggest changes to designers for a better solution to a structural element.
- *Personal – capacity of resilience (e.g. for stress, time pressure)* – changing the level from 2 to 3 was proposed by one person, stating in justification that a person in this position must be able to cope with various situations.

The proposal to reduce the level of required competencies appeared only once and concerned the reduction of *Personal competencies - loyalty, involvement, responsibility* – from level 4 to level 3. According to the respondent, the highest level of this competence is not required, because the cost estimator's obligation is to prepare a cost estimate in accordance with the investor's intentions.

5.2 Field of study: logistics technician

Analyzed positions and number of respondents who defined the current desired level of competences:

P1 - Warehouse operator – 6 respondents (1PL, 2ES, 1BG, 2GR)

P2 - Logistic specialist – 9 respondents (3PL, 2ES, 2BG, 2GR)

P3 - Junior Warehouse manager – 4 respondents (2PL, 1ES, 1GR)

P4 - Procurement specialist – 4 respondents (2PL, 1ES, 1GR)

P5 - Transport planner – 9 respondents (4PL, 2ES, 1BG, 2GR)

Competency level for the position P1: Warehouse operator

The analysis of competency levels for the profession was performed by 6 respondents.

The changes considered are marked in red font.

For this position, most of the changes proposed by respondents concerned lowering the level of competences:

- *Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)* – three respondents proposed changing the level from 4 to 3, one respondent from level 4 to 2. The justification stated that operators work mainly independently.
- *Organization and self-organization – time management, self-reliance* – three respondents proposed changing the level from 4 to 3, one respondent from level 4 to 2. The justification stated that operators have a specific detailed scope of responsibilities and are expected to perform them, so there is not much space to organize your own work.
- *Personal - capacity of resilience (e.g. for stress, time pressure)* – one respondent suggested changing the level from 4 to 3, another - to 2. The justification stated that working in this position can be stressful because there are more and more responsibilities, but despite the highest level is not required. Compared to other positions in the logistics industry, work stress is low.
- *Analytical – problem-solving skills* – changing the level from 2 to 1 was suggested by one person, justifying that the work in this position is repetitive and someone else is responsible for its organization. If problems arise, someone else is responsible for solving them.

The suggestion to increase the level of competency (from 2 to 3) for this position appeared only once and concerned *IT - software literacy*, with the justification that IT skills are becoming more and more important.

Competency level for the position P2: Logistic specialist

The analysis of competency levels for the profession was performed by 9 respondents.

The changes considered are marked in red font.

In the case of this position, respondents only proposed increasing the level of required competences:

- *Vocational – theoretical knowledge* – increasing the level from 2 to 3 was proposed by four respondents (out of 9), another one proposed increasing it by 2 levels (to level 4). The justifications included the following statements:
 - o The specialist's level of theoretical knowledge should be higher than level 2.

- o The better your theoretical knowledge, the better your understanding of your responsibilities and assigned tasks.
- o The specialist should have knowledge not only of logistic terms, but also of various legal and environmental protection regulations.
- *Analytical - problem-solving skills* – three respondents suggested increasing the level from 2 to 4, and another two suggested changing the level to 3. The justifications concerned the need to be able to deal with problems that are common in this profession, and emphasized the importance of analytical skills (e.g. analysis of the market, storage system, optimization of space and traffic in the warehouse). According to respondents, these competencies are also important from the perspective of supervising the team's work and dealing with various situations within the team.
- *Interpersonal - communication, teamwork* – four respondents suggested raising the level from 2 to 3, and another two suggested changing the level to 4. Justifications for increasing the level of required competences:
 - o A logistics specialist is part of a team, therefore communication and the ability to work in a team are competences that he should have at a high level.
 - o An effectively functioning team must be well-coordinated, and this depends on the competences of its individual members in this area.
 - o The complexity of the work and responsibilities in this position requires very high competences in communication and teamwork.
 - o Communication skills are needed to manage various situations and crisis management.
- *Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)* – the initial level value for this competence was 1. The need to increase the level was reported by 7 respondents (two to level 2, three to level 3 and one to level 4). Justifications indicated by respondents:
 - o The logistics industry is culturally diverse and geographical boundaries are blurring. Teams are made up of people from different cultures, from different generations.
 - o Society is aging and teams are becoming more diverse in many respects (age, nationality).
 - o People holding this position must have these competencies at a high level due to the complexity of their work and responsibilities.
 - o The importance of interpersonal skills is increasing as the industry becomes multicultural and requires the ability to work with many different people.
 - o Respect and understanding for diversity and different cultures in the work team are necessary.

- *Learning – openness to lifelong development* – increasing the level of competences from 2 to 3 was reported by four respondents. The justification indicated the need to constantly improve qualifications due to constant changes in the industry.
- *IT – software literacy* – increasing the level from 3 to 4 was proposed by three study participants. In their opinion, knowledge of industry-specific software is essential nowadays. Not only the awareness of the existence of various programs, but also the ability to select them to suit the specific nature of the company.
- *Organization and self-organization – time management, self-reliance* – according to two people, the level of this competence should be 4 (raising the level from 3 to 4). They justify the increase in the level by the specific nature of the industry - working in logistics means working under time pressure, which in turn requires the ability to organize one's own work very well. An employee with these competencies at a low level is ineffective and requires constant monitoring, which companies cannot afford.
- *Personal – loyalty, involvement, responsibility* – changing the level from 2 to 3 was proposed by two respondents. In their opinion, commitment and responsibility for the assigned tasks must be at a higher level than level 2 - this determines not only the effect of a given person's work, but also that of the entire department or company (domino effect).
- *Personal – capacity of resilience (e.g. for stress, time pressure)* – changing the level from 3 to 4 was proposed by two people, justifying the need for a change by the frequent occurrence of changes and problem situations in this position that generate a high level of stress. The ability to cope with stress is necessary to prevent burnout.
- *Vocational - practical skills* – one person was in favor of increasing the level from 3 to 4, stating in justification that professional practical competences at the highest level make it easier to find a job and shorten the time necessary to get used to the duties.
- *Language – knowledge of foreign languages* – one person also increased the level of competence from 2 to 4, justifying it with the specificity of the industry and the need to very good knowledge of English (and preferably another foreign language).
- *Creativity – generating new ideas, creative style of work* – in this case one person reported the need to increase the level of competence from level 2 to 4. In her opinion, this position requires a very good ability to creatively approach the problems encountered.

Competency level for the position P3: Junior Warehouse manager

The analysis of competency levels for the profession was performed by 4 respondents.

The changes considered are marked in red font.

Almost all the proposed changes concerned increasing the originally assumed level of competences:

- *Vocational – theoretical knowledge* – all respondents were in favor of increasing the level of competences (three people from level 2 to 3, one person to level 4). In their opinion, theoretical knowledge at a level higher than level 2 is required to work in this position.

- *Personal – capacity of resilience (e.g. for stress, time pressure)* – all respondents reported the need to increase the level of this competence from level 3 to level 4. The warehouse manager is responsible for the work and efficiency of the entire team, he must cope with many challenges (multi-tasking), solve problems under time pressure - this generates a high level of stress. The ability to cope with stress at a high level is necessary.
- *IT - software literacy* – an increase in the level from 3 to 4 was reported by two study participants, justifying the change by the common use of software in this position (software for warehouse management, for planning transport routes). Not only the skill of operation itself is important, but also the ability to properly use the possibilities given software.
- *Analytical – problem-solving skills* – increasing the level from 3 to 4 was proposed by two respondents. In their opinion, the highest level of analytical competences is necessary due to the dynamics of the industry's development and problems with employees (high demands, demandingness). Analytical skills help solve complex problems (which may involve people, work organization or products).
- *Creativity – generating new ideas, creative style of work* – two respondents were in favor of increasing the level of these competences (one person from level 2 to 3 and one person from level 2 to 4). The need for the change was justified by the fact that the manager's position requires the ability to creatively solve problems, e.g. when organizing unloading or optimizing work (neither the transport company nor the company receiving the cargo can afford long downtime). In logistics, the ability to optimize processes is very important, and this skill requires a high level of creativity. Currently, there is no way to recreate processes - you have to creatively look for savings (space, time, costs).
- *Vocational – practical skills* – according to one person, the required level of this competence should be raised from level 3 to 4, justifying it with the specificity of the logistics industry.

Lowering the level of required competences:

- *Language – knowledge of foreign languages* – one person suggested lowering the level of language competences from 3 to 1. In her opinion, this is an internal position, without contact with clients and contractors, therefore language knowledge is not important.
- *Personal – loyalty, involvement, responsibility* – one person found the original level 4 too high and suggested a reduction to level 3, justifying the need to maintain a balance between professional and private life.

Competency level for the position P4: Procurement specialist

The analysis of competency levels for the profession was performed by 4 respondents.

The changes considered are marked in red font.

In the case of this position, almost all changes proposed by 4 respondents concerned increasing competence levels:

- *Personal – capacity of resilience (e.g. for stress, time pressure)* – all respondents were in favor of increasing the level of these competencies from level 3 to 4. In their opinion, work in purchasing is very stressful (delays in deliveries, war in Ukraine), hence the highest level of competence is necessary.
- *Organization and self-organization – time management, self-reliance* – increasing the level from 3 to 4 was proposed by two study participants. The justification stated that the person holding this position must have the highest level of self-organization skills, because any delays on his part may stop production and expose the company to losses.
- *Vocational – theoretical knowledge* – one person believes that the required level of competence for this position should be 4 (the current level is 3). In her opinion, it is necessary to know purchases, the market for a given raw material, negotiations, regulations and subsidy rules. Since the outbreak of the war in Ukraine, there have been major changes in the purchasing market and you need to be aware of them.
- *Language – knowledge of foreign languages* – one person believes that the level for this competence should increase from 3 to 4, because contacts with suppliers from different countries require a very good knowledge of at least English (knowledge of other languages is advisable).
- *Interpersonal – communication, teamwork* – according to one person, the required level of competence for this position should increase from 3 to 4.
- *Creativity – generating new ideas, creative style of work* – changing the level from 3 to 4 was suggested by 1 person.
- *Learning – openness to lifelong development* – changing the level from 3 to 4 was proposed by 1 person who believes that LLL is a necessity in the logistics industry.

Lowering the level of *IT competences - software literacy* was suggested by one person (from level 3 to 2). In her opinion, IT systems in the logistics industry work similarly, you do not need to have a high level of knowledge - it can be learned. Very good knowledge of Excel is important.

Competency level for the position P5: Transport planner

The analysis of competency levels for the profession was performed by 9 respondents.

The changes considered are marked in red font.

As with other positions in the logistics industry, most of the changes concerned increasing the level of competences:

- *IT – software literacy* – according to six people, the level of competence should change from 2 to 3, because knowledge of industry-specific software is and will be the basis for work in this profession. It is necessary to freely use specialized software and keep up with constant changes in this area (technology is developing very quickly).
- *Vocational – theoretical knowledge* – six respondents believe that the level of competence should be increased from 2 to 3, because very good knowledge of theoretical foundations

is the basis for work in this profession and allows you to work more professionally and effectively.

- *Interpersonal - communication, teamwork* – in the opinion of two people, the level for this competence should be increased from 3 to 4. The planner cooperates with all other departments operating in the company, at every level, communicates with suppliers, recipients and drivers. This means that communication skills must be at the highest level.
- *Creativity – generating new ideas, creative style of work* – two people believe that the originally assumed level 2 should be raised (according to one person to level 3, according to another person – to level 4). In justification of the changes, they emphasize that the logistics industry is changing very quickly, you need to track the changes, keep up with them and be able to incorporate them into your work.
- *Vocational – practical skills* – in the opinion of one person, the level of competence should be raised from 3 to 4, because practical skills are very important in this profession.
- *Personal – loyalty, involvement, responsibility* – changing the level from 3 to 4 was suggested by one person, who believed that due to the huge responsibility of the planner, it is necessary to get involved in the work and take responsibility for the tasks performed at the highest level.

The suggestion to lower the level of required competences appeared for:

- *Language – knowledge of foreign languages* – lowering the level from 4 to 3 was suggested by two people, who believe that knowledge of a foreign language is required in this profession, but not at the highest level.
- *Vocational – practical skills* – one person believes that level 3 for this position should be lowered to level 2, because with good theoretical preparation, practical skills can be acquired in the workplace.
- *Organization and self-organization – time management, self-reliance* – lowering the level from 4 to 3 was suggested by 1 person, stating in justification that the independent position of a transport planner requires very good organizational skills, but not necessarily at the highest level.

5.3 Field of study: renewable energy technician

Analyzed positions and number of respondents who defined the current desired level of competences:

P1 - Renewable energy consultant – 8 respondents (2PL, 2ES, 2BG, 2GR)

P2 - Solar power plant operator – 3 respondents (1ES, 1BG, 1GR)

P3 - Geothermal technician – 1 respondent (1BG)

P4 - Onshore wind energy engineer – 4 respondents (2PL, 1ES, 1GR)

P5 - Hydropower technician – no respondents

Competency level for the position P1: Renewable energy consultant

The analysis of competency levels for the profession was performed by 8 respondents.

The changes considered are marked in red font.

The respondents only proposed increasing the level of competences:

- *Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)* – increasing the level from 2 to 3 was proposed by four respondents, another proposed changing it to level 4. Justification for increasing the level of competences:
 - o Working in this profession requires contacts both with clients and within the company.
 - o The renewable energy industry draws on the experience of more mature markets, most innovative technologies are created abroad, and their implementation in Poland requires the ability to work in diverse teams.
 - o The sector needs a lot of young forces, therefore a higher level of intergenerational competences is needed.
- *Analytical – problem-solving skills* – increasing the level from 2 to 4 was proposed by 3 people, increasing the level from 2 to 3 – one person. The increasing level of complexity of problems and issues as well as strong specialization in particular areas has a significant impact on raising the level. Consultants are required to respond quickly to problematic situations and to think analytically.
- *Language – knowledge of foreign languages* – according to two people, the level for this competence should be raised from 2 to 3, while one person believes that it should be raised to level 4. The justification for raising the level of language competences includes information about an increase in the number of clients from abroad, about training materials, conferences only in English, about international networks of suppliers and customers, and about software in English.
- *Creativity - generating new ideas, creative style of work* – the assumed level 2, according to two respondents, should be raised to level 3, according to one respondent - to level 4. The justification states that creativity is required to select the proposed solution to the specific needs of the client, which is difficult due to the increasing level of complexity of problems and issues and strong specialization in particular areas.
- *IT – software literacy* – the need to increase level 3 to 4 was reported by two respondents. The justification states that the renewable energy industry is already mature. There are many areas that require the analysis of large amounts of data using specialized programs. The consultant should be an expert in using all new technologies and software.
- *Personal – loyalty, involvement, responsibility* – according to two people, the level of competence should be increased from 3 to 4, because the consultant begins the process of cooperation with the client – the number of orders (and, consequently, the condition of the company) depends on his involvement and responsibility.
- *Personal – capacity of resilience (e.g. for stress, time pressure)* – according to one of the respondents, the level of competence should be increased from 3 to 4. The justification concerns the high level of stress when working with clients. It is necessary to be able to convey technical information to the client in clear (understandable to a layman) language.
- *Organization and self-organization – time management, self-reliance* – one person believes that the level of competence should be raised from 3 to 4, because this profession

requires discipline, timely work and good work organization, nothing can be postponed later.

Competency level for the position P2: Solar power plant operator

The analysis of competency levels for the profession was performed by 3 respondents.

The changes considered are marked in red font.

In the case of this position, the competence levels indicated by three respondents largely agree with those initially assumed.

Increasing the level of competence was proposed for:

- *Analytical – problem-solving skills* – one person believes that level 2 should be raised to 4, because this position requires the ability to think quickly and react to unpredictable situations.
- *Personal – capacity of resilience (e.g. for stress, time pressure)* – according to one person, the level for this competence should be increased by 2 out of 3, because in this profession it is necessary to be able to resist pressure, which generates stress.

Competency level for the position P3: Geothermal technician

The analysis of competency levels for the profession was performed by 1 respondent.

The changes considered are marked in red font.

The proposed changes concerned both increasing and lowering the required level.

Increasing the level of competence concerns:

- *Analytical – problem-solving skills* – raising from level 2 to 3.
- *Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)* – raising from level 2 to 3.
- *Personal – loyalty, involvement, responsibility* – raising from level 3 to 4, because the technician has a high responsibility for performing the work in line with the management's expectations.

The reduction in the level of competence applies to:

- *Interpersonal – communication, teamwork* – lowering the level from 3 to 2.
- *Organization and self-organization – time management, self-reliance* – lowering the level from 3 to 2.
- *Learning – openness to lifelong development* – lowering the level from 4 to 3.

Competency level for the position P4: Onshore wind energy engineer

The analysis of competency levels for the profession was performed by 4 respondents.

The changes considered are marked in red font.

The proposed changes mainly concerned increasing the level of competences:

- *IT – software literacy* – according to two people, it is necessary to change the level from 3 to 4, because this position requires fluent knowledge of wind farm software.

- *Personal – loyalty, involvement, responsibility* – in the opinion of two people it is necessary to increase the level of competences (according to one person from level 2 to 3, according to another – to 4). In the opinion of respondents, the profession is niche, well-paid - people employed in this position are required to constantly improve their knowledge.
- *Language – knowledge of foreign languages* – in the opinion of one person, the level of competence should be increased from 2 to 3.
- *Personal – capacity of resilience (e.g. for stress, time pressure)* – in the opinion of one person, the level of competence should be increased from 3 to 4.

A proposal to lower the required level of competencies was made by one respondent and concerned the *Interpersonal competencies - work in diverse teams (e.g. multicultural, multigenerational)* – change from level 3 to level 2. The justification stated that the ability to work in a team is not as important as independence, discipline and good organization.

Competency level for the position P5: Hydropower technician

None of the respondents analyzed the level of competence for this position.

6 Summary of the study – current profiles

To summarize the results of the research, it should be stated that two issues could be found in the respondents' statements, regardless of the field of education. The first was the need to increase the importance of analytical competences, primarily due to the significant increase in the importance of artificial intelligence in relation to the professions of graduates. The second was to increase attention to green solutions related to greater respect for environmental requirements. Additionally, it is worth mentioning the increased importance of soft skills, emphasized by many respondents.

In the second part of the IDI, the role of the respondents was to assess the desired level of competences for selected job positions in which graduates of the following fields of study are/will be most often employed: construction technician, logistics technician, renewable energy technician. The current required level was compared to that determined in the first study. In the case of a proposal to change the current level, respondents were asked to justify their opinion. Most of the respondents' opinions concerned the increase in the desired level of competences in relation to those determined on the basis of the first study. Much less numerous proposals concerned lowering the initially adopted desired level of competences. The exception in this respect concerned the position of Logistics technician: P1 - Warehouse operator, where most of the proposed changes were to lower the desired level. Not all changes proposed by respondents were included in the currently adopted competence profiles. Those changes that were proposed with justification by the majority of respondents assessing the requirements for a given position were considered justified, or at least half of them if at least one change concerned increasing the level of competences by 2 (from 1 to 3 or from 2 to 4). Ultimately, the following number of changes were made:

- construction technician - one shift (increasing the level of competence for the position of Foreman / junior site manager);
- logistics technician - eleven changes (including increasing the level of competences - 9 changes - for the positions: Logistic specialist, Junior Warehouse manager, Procurement specialist, Transport planner; lowering the level of competences - 2 changes - for the position: Warehouse operator);
- renewable energy technician - three changes (increasing the level of competences for the positions: Renewable energy consultant, Onshore wind energy engineer).

The introduced changes are marked in the tables containing the current competence profiles – changes in plus (increase in the desired level of competence) in red, changes in minus (decrease in the desired level of competence) in blue. The changes introduced are justified by the quantitative results and comments presented in part 5 of the report. In no case was the desired level of competence changed by more than 1 (in plus or in minus).

COMPETENCY PROFILES FOR 5 JOB POSITIONS IN CONSTRUCTION SECTOR

Skills & competencies	P1: Foreman / junior site manager	P2: Construction technician	P3: Project designer-junior / draughtsman	P4: Technician in geodesy	P5: Cost estimator
	Level	Level	Level	Level	Level
Vocational – theoretical knowledge	4	3	3	4	3
Vocational – practical skills	4	3	3	4	3
IT – software literacy	3	3	4	3	3
Language – knowledge of foreign languages	2	2	2	2	1
Analytical – problem-solving skills	4	2	4	3	3
Interpersonal – communication, teamwork	3	3	4	3	2
Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)	3	3	4	3	3
Organization and self-organization – time management, self-reliance	4	3	4	3	3
Creativity – generating new ideas, creative style of work	3	3	3	2	2
Learning – openness to lifelong development	3	3	4	4	3
Personal – loyalty, involvement, responsibility	3	3	4	4	4
Personal – capacity of resilience (e.g. for stress, time pressure)	4	3	3	4	2

COMPETENCY PROFILES FOR 5 JOB POSITIONS IN LOGISTIC SECTOR

Skills & competencies	P1 - Warehouse operator	P2 - Logistic specialist	P3 - Junior Warehouse manager	P4 - Procurement specialist	P5 - Transport planner
	Level	Level	Level	Level	Level
Vocational – theoretical knowledge	2	3	3	3	2
Vocational – practical skills	3	3	3	4	3
IT – software literacy	2	3	3	3	3
Language – knowledge of foreign languages	1	2	3	3	4
Analytical – problem-solving skills	2	3	3	4	3
Interpersonal – communication, teamwork	3	3	4	3	3
Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)	3	3	4	2	3
Organization and self-organization – time management, self-reliance	3	3	4	3	4
Creativity – generating new ideas, creative style of work	2	2	3	3	2
Learning – openness to lifelong development	2	2	3	3	3
Personal – loyalty, involvement, responsibility	4	2	4	3	3
Personal – capacity of resilience (e.g. for stress, time pressure)	4	3	4	4	4

COMPETENCY PROFILES FOR 5 JOB POSITIONS IN RENEWABLE ENERGY SECTOR

Skills & competencies	P1 - Renewable energy consultant	P2 - Solar power plant operator	P3 - Geothermal technician	P4 - Onshore wind energy engineer	P5 - Hydropower technician
	Level	Level	Level	Level	Level
Vocational – theoretical knowledge	4	4	4	3	4
Vocational – practical skills	4	4	4	4	4
IT – software literacy	3	3	3	3	2
Language – knowledge of foreign languages	2	2	2	2	2
Analytical – problem-solving skills	3	2	2	4	3
Interpersonal – communication, teamwork	3	2	3	3	4
Interpersonal – work in diverse teams (e.g. multicultural, multigenerational)	3	2	2	3	4
Organization and self-organization – time management, self-reliance	3	3	3	4	4
Creativity – generating new ideas, creative style of work	2	3	2	3	3
Learning – openness to lifelong development	4	4	4	4	3
Personal – loyalty, involvement, responsibility	3	2	3	3	2
Personal – capacity of resilience (e.g. for stress, time pressure)	3	2	3	3	2