ANALYSIS OF THE GREEN SKILLS SITUATION IN THE REPUBLIC OF NORTH MACEDONIA

"Research on green skills and their potential in secondary education in Republic of North Macedonia"

(with a focus on secondary vocational education)

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IMPRESSUM

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THEORETICAL ASPECTS OF THE CONCEPT OF GREEN SKILLS

EXECUTIVE SUMMARY

Modern mankind faces many challenges. One of the most significant is the challenge of acquiring new skills that will contribute to the endangered environment preservation and tackling climate change. It is about more efficient production with lower CO_2 emissions, including the generation of larger energy quantities from renewable sources. Thus, a relevant contribution is made to the process of *greening the economy* and creating a basis for it to gradually become sustainable. To this end, it is required to analyze the emergence of *green skills* that will be in line with current changes and processes, while also including the newly emerged green jobs. Green skills should gradually contribute to maintaining and restoring the quality of the environment and avoiding future damage to eco systems.

Green skills require a wide range of qualifications, education and skills. They exist not only in the private sector, but also in the public sector, including the area of scientific and academic institutions, professional associations, etc. ***Green skills*** include skills that serve the purpose of providing products or services that improve energy efficiency, expand the use of renewable energy sources, or support environmental sustainability. These skills are the basis for performing work in any of the numerous categories of green economic activity including: the use of renewable energy sources and alternative fuels; energy efficiency; management, prevention and reduction of pollution, waste and greenhouse gases; environment cleanup and remediation, and waste disposal and reduction; sustainable agriculture; education, regulation, legal compliance, public awareness and training, etc.

Education plays an important role in generating changes in individuals' behavior towards the environment. The need for new skills in the process of transition to a "green" economy takes place through education and educational policies at all levels. Important behavioral attributes such as awareness and attitudes related to environmental protection are developed in the course of primary, secondary and higher education.

"Green" skills are required to produce competent individuals. This is confirmed by a range of examples and experiences around the world. By acquiring such skills, individuals become competitive by having "green" characteristics and the ability to contribute to maintaining the environmental balance.

The Republic of North Macedonia is facing the challenge of implementing serious reforms in its social system. In the context of these reforms, of crucial importance to country's development are the reforms in the field of environmental protection and sustainable development, including the energy efficiency issue. Therefore, one of the main *research objectives* in this segment was to analyze the individual strategies, reports and relevant legislation and legal acts, in order to find out whether they explicitly or implicitly contain parts that can be of importance to the creation of an atmosphere for the emergence of green skills in our country.

The focus of this part of the research is aimed at analyzing the strategies in the area of environmental protection, sustainable development, and other strategies related to these issues. A review was also made of strategies and programs related to economic development, especially the issues of energy efficiency, workforce and employment in our country. The same research principle was also applied to the analysis of individual legal acts. The choice was made on the basis of strategies and legal acts' relevance in terms of the issues studied, i.e., the creation of prerequisites for green skills development. As to the time horizon, the analysis takes into account current strategies and documents, but also those that have been developed during the last 15-20 years. In doing so, the intention of our country to integrate and accede to the EU was taken into account, which in principle is reflected in the strategic documents analyzed and legal acts prepared in accordance with the EU standards.

The studies entitled *Skills for green jobs*, carried out in 2010 and 2018 by the International Labor Organization (ILO) and the European Centre for the Development of Vocational Training (Cedefop), served as a benchmark in this part of the analysis. They included 6 European Union Member States such as: Denmark, Germany, Estonia, Spain, France and the United Kingdom.

The general impression is that the strategies and the laws related to this issue in our country either *do not, or very little and indirectly discuss the issue of green skills*. Positive signals of change could be recognized more recently in the initiatives of the Ministry of Education and Science. At the ministerial meeting for education and training within this year's Western Balkans Platform, in his address, the Minister of Education and Science, Jeton Shaqiri, emphasized that the green and digital Europe initiatives were introduced into the new Primary Education Concept in our country; however, they would also be involved in the new Law on Secondary Education and the Secondary Education Concept.

The lack of *modern skills* among the workforce is a contributing factor to the modest *labor market* performance in our country. Taking targeted and incentivizing activities by relevant policy-makers in the direction of improving and advancing such skills would contribute significantly to the increased workforce productivity and quality, and it would certainly help to further reduce unemployment.

In the last 15 years, there has been an increasing interest in the issues of *energy efficiency* (EE) and the use of *renewable energy sources* (RES) in Macedonian society. This sends positive signals towards creating an atmosphere for the acquisition of green skills by the workforce. However, this is limited due to a number of drawbacks related to raising the issue of energy efficiency (poor purchasing power of the population for energy efficiency investments; complex secondary legislation on energy efficiency and use of RES; questionable institutional capacities; low energy efficiency in energy production, transport, distribution and consumption, as well as methodological barriers in terms of recording green jobs, and thus, green skills as relevant categories). On the other hand, there are still opportunities to implement *energy efficiency* projects and based on that, create green jobs and green skills. Some of the more significant ones include: Macedonia's membership in the Energy Community, the possibility of additional employment in the energy sector and engagements of other domestic companies, the fact that energy efficiency is economically feasible, as well as the high electricity consumption in households.

The obligations that the accession process to the EU will bring, will confront Macedonian *industrial companies* with increased requirements for fixing their negative impacts on the environment. In addition, polluting industrial companies will have to look for ways of higher energy efficiency. This creates space for creating green skills in this sector.

The situation in *the construction sector* until recently has indicated insufficient interest of the construction companies in enhancing their activities in terms of EE and greater use of RES. However, construction is still retaining the role of a sector where there is significant room for creating green skills among the workforce. Also, a significant part of the Macedonian population is rural and they can be trained in green skills, given the confirmed intentions that the development of our *agriculture* should move in the direction of organic production.

International experiences speak of a generally weak and insufficient presence of green skills in vocational education and training (VET). Basically, this results from the mismatch between VET and environmental protection policies and state development strategies, and also the lack of connection between VET institutions and the economy. A breakthrough was made through the 2019 vocational technical education reforms supported by the World Bank.

The vocational education and training system should match the economic, demographic and cultural environment. In this context, the assessment of workforce and skills development

should follow the logic of local economic development (LED). The planning of educational profiles/qualifications and skills that will be needed in the future should depart from local needs and development plans. Certainly, green skills should also be included in this context, given that environmental protection is a significant segment of LED.

In the complex everyday life, *obstacles* often appear that either directly or indirectly discourage the creation of green skills. Obstacles occur both on the demand and supply sides of such skills. There, one must not forget the *state* and its institutions, which can act as a disincentive by their (in)adequate engagement. On *the demand side of such skills, the lack of information and knowledge about current world trends and the inability to follow them due to the low competitiveness often appears as an obstacle.* Also, *economic crises and recessions* have a negative impact on the emergence of new green skills because they lead to a change in the priorities of companies (they are forced to rationalize their costs). Hence, the current economic crisis is reflected in cost cutting and reduced investments in the professional development of employees of economic entities, especially among small and medium-sized enterprises. Another obstacle is the *workforce migration to other countries, especially to neighboring countries and the EU*. This constitutes an "export" of qualifications outside the country. Finally, *grey economy* also appears as a demand-side barrier that can disincentivize the emergence of green skills, as the workforce engaged in the informal economy cannot usually qualify for access to formal training organized by the state.

Obstacles that can appear on the *supply side* of green skills relate to the vocational education and training system. The national education system in certain cases shows the need for additional teacher training programs regarding specific skills. Also, training needs should be subject to prediction within the respective institutions, and this should result from the cooperation between stakeholders (training and education institutions, professional chambers and associations, non-governmental organizations and the Government). *Cooperation with business and business actors* can help a lot in this direction. The increasing number of dual education examples, which result from the cooperation between the secondary vocational education subsystem and chambers of commerce, are confirmation that this is a very important practice.

The main goal of this research performed regarding "green" skills and their potential in North Macedonia's secondary education, with special reference to secondary vocational education, is to identify opportunities, potentials and capacities in the country for acquiring "green" economy skills ("green" skills), as well as the possibilities for their integration in secondary education (with a focus on secondary vocational education) and thereby contribute to the realization of the project "Encouraging children and young people in North Macedonia to become drivers of change in reducing communities' vulnerability to climate change" implemented by UNICEF with the financial support of the Swedish International Development Cooperation Agency (SIDA) and in partnership with the project "Education for Employment in North Macedonia" funded by the Swiss Agency for Development and Cooperation.

The objectives of this research on "green" skills and their potential in North Macedonia's secondary education, with special reference to secondary vocational education, include the following:

- Gain a general overview of the current situation, and identify the possibilities for integrating "green" skills in the educational process of secondary vocational education.
- Identify where the "green" skills qualifications come from, i.e., do a thorough analysis of the contents of modularly designed curricula for secondary vocational education.
- Gain knowledge about the perceptions, opportunities and needs for the development and advancement of "green" skills and qualifications in secondary vocational education among relevant stakeholders in the Republic of North Macedonia (educational institutions, state institutions, NGOs, the private sector etc.).

A general overview of the current situation and identification of the possibilities for integrating "green" skills in the educational process of secondary vocational education was made through the analysis of qualifications acquired by students after their completion of secondary vocational education in the Republic of North Macedonia. As a source of data for drafting this analysis, the first edition of the "Guide through the qualifications in vocational education" was used, which contains information on 14 occupations/sectors for which the Center for Vocational Education and Training (CVET) is responsible. As a general conclusion from the analysis of qualifications for occupations in the two-year, three-year and four-year vocational education, it can be said that some students are qualified in terms of knowledge and skills for environmental sustainability and protection ("green" skills) in several sectors or professions; however, not in all profiles belonging to one profession.

Identification of where the established "green" skill qualifications come from, that is, a thorough analysis of the contents of modularly designed curricula for secondary vocational education, was performed by applying the research technique of keyword search. The subject of this analysis was the presence of teaching units and activities related to the sustainability and environmental protection concept in vocational subjects curricula, and how much such content is incorporated into the curricula offered. This methodological approach also enabled to identify the level of "greenness" of both the individual subject curricula and each of the profiles analyzed. Current secondary vocational education curricula were used for the analysis. The existing model according to which the curricula for educational activities in secondary vocational education are developed, allows to acquire general knowledge about the integration of contents related to "green" economy, sustainability and environmental protection and identification of "greenness" level. By searching for keywords and establishing their presence in the mandatory components of the respective subject curriculum in terms of number and variety thereof, the integration of contents on "green" economy, sustainability and environment can be determined from 1 (low) to 5 (strong) integration. By determining the percentage share of subjects in which contents on "green" economy and environmental sustainability are integrated in the total number of vocational subjects envisaged for the educational profile/qualification, it is possible to establish the level of curriculum "greenness" as low, medium or high. The analysis included curricula for a total of 18 educational profiles, that is, one profile from each profession where green skills qualifications were identified during the analysis of the Guide. A total of 351 vocational subject areas were individually analyzed and levels of integration of "green" economy, sustainability and environment contents were established in 91 vocational subjects. The tables prepared regarding the 351 vocational subjects (courses) and the "green" economy, sustainability and environment contents' integration levels established are included as appendices to the main text and available atthe following link. In order to gain insight into the possibility of acquiring qualifications with "green" skills in vocational education, a review was made of the curricula and all other educational profiles/qualifications or educational profiles/qualifications that were not subject to a thorough analysis. Due to time constraints, the profiles/qualifications' curricula and subjects that according to their name and thorough analysis findings give an indication of having a good (4) and strong (5) levels of integration of "green" skills, sustainability and environment contents, were reviewed and identified.

In general, low "greenness" was identified in half of the vocational teaching curricula analyzed, where it should be taken into account that three-year educational profiles are dominated by medium-level "green" curricula, while in four-year vocational profiles, 80% have low "greenness". Similar findings also resulted from the in-depth analysis, where more than half of the analyzed teaching vocational subjects (59%) had a low level (1) of integration of contents on "green" economy, sustainability, environmental protection and "green" skills. Subjects that, according to their name, indicate that they have a good (4) and strong (5) level of integration of content on "green" skills, sustainability and the environment, were also identified in the curricula of the educational profiles/qualifications that were not included in the in-depth analysis. These findings point to the conclusion that vocational education has the potential to ensure the acquisition of qualifications with "green" skills and be a basis for integrating additional content on "green" economy, sustainability and environmental protection.

In order to find out about the perceptions, opportunities and needs for the development and promotion of qualifications for "green" skills in secondary vocational education among relevant stakeholders in the Republic of North Macedonia, primary data were collected from state institutions working in the field of education (Bureau for Development of Education - BDE and the Center for Vocational Education and Training - CVET), young people, high school students in secondary vocational schools throughout the country and the business sector (private company employers). Semi-structured interviews, unstructured observation and exploratory survey were used as research methods and techniques. The forms used for the collection of primary data, as well as links to available relevant public presentations are appendices to the main text and they are available at the following link.

The forum entitled "Skills for a Green City" was used as a data source for the unstructured observation, and it was organized within the Project "European platform for excellence in vocational education and training for 'green' innovations – GREENOVET" and the initiative "European Vocational Skills Week". The forum's general conclusion was that vocational skills are the key to a faster "green" transition of the economy and society in general, so therefore, it is necessary for all stakeholders to work actively and intensively on such skills' development and inclusion in both the curricula and educational processes.

From the semi-structured interviews conducted with representatives of the Center for Vocational Education and Training (CVET) and the Bureau for Development of Education (BDE), valuable findings and knowledge about the possibilities, potentials and capacities to integrate the contents of sustainable development and "green" skills in secondary vocational education were obtained. In fact, the relevant stakeholders from state institutions working in the field of education, within their own competences and capacities, continuously make efforts to develop vocational education, especially towards its matching with the labor market.

The exploratory research was carried out through an online survey of high school students from secondary vocational education and employers in the territory of the country, and it allowed to get general knowledge about the level of "green" skills awareness, including the perceptions and valuation of "green" skill competencies by vocational high school students and employers. The findings were analyzed comparatively and they gave relevant clues about which aspects should be focused on in future research and efforts to determine and utilize the opportunities and potential of "green" skills in secondary vocational education in the Republic of North Macedonia. Namely, there is a fairly high level of awareness of "green" skills among respondents; however, the potential for their implementation in vocational education is not fully utilized.

FOREWORD

In the last two or three decades, there has been a serious debate among experts and the general public globally regarding energy and environmental issues, including the green economic activity topic. Since the beginning of the Covid-19 pandemic, and especially after the start of the war in Ukraine, the intensity of this debate has not diminished. On the contrary, the dilemmas remained and were even augmented with the emergence of the energy crisis, especially on the European continent. Therefore, initiatives to pay more attention to energy efficiency and environmental sustainability are now growing. The result of this is an increased demand for information related to "greening" economy jobs and skills.

A central feature of the upcoming transformation will be the green skills associated with green jobs. Green skills will be analyzed in this research. According to the considerations presented, the areas of their emergence are wide. However, the economic activity carried out globally that can be described as "green" is still a small fraction nowadays.

In a few decades, global economy will have to become a low-carbon economy. Hence, it is clear that some measures are required to expand green economy and increase the amount of green skills that should match green jobs. Certainly, this process is very important not only for developed countries, but also for developing countries.

The fast-growing interest in environmentally sustainable economic activities implies that the transition to a cleaner and greener growth should be accelerated. Education, especially secondary vocational education, is one of the key areas that can make such transition faster and more lasting, by equipping the future workforce with basic knowledge and training in the fields related to green economy. Namely, in the most general sense, better education leads to greater prosperity, improvement of the situation in all spheres or economic sectors, less violence, greater gender equality, higher social capital and an improved natural environment. The rapid growth of "green" technology leads to greater production and high awareness and care for the environment, which are most often gained in the educational process. The dissemination of knowledge and the promotion of "green" skills contribute to changes in each individual's behavior, values and lifestyle both in the present and future.

In this sense, it must be emphasized that education plays an important role in changing the behavior of individuals towards their environment. The need for new skills in the process of transition to a "green" economy takes place through education and educational policies at all levels. Important behavioral attributes, such as awareness and attitudes related to environmental protection, are developed during primary, secondary and higher education. However, although in the past decade secondary schools have promoted sustainable development education by integrating care for the environment into school curricula, there still remains the need for gaining awareness and adopting specific green skills that should be fully integrated, especially in secondary vocational education and training. Thus, the "greening" of various occupations will be enabled and the development of new occupations will be supported.

As far as sustainability is concerned, there seem to be no dilemmas. There is probably no room for doubt about the application of the just transition concept. It is a matter of principles required to be incorporated in the respective policies of the countries, and also in companies' business practices. With time, individuals' behavior should also be increasingly guided by these principles. Therefore, the establishment of an integrated education and training system that will include various sustainability aspects and concepts in the process of developing "green" skills can contribute to understanding and protecting the environment. These contents should be included in all educational levels and vocational training. Thus, both existing and future employees would acquire both theoretical and practical skills (generic and specific competencies), which would make them competitive on the labor market, especially in terms of "green" jobs. This would mark the milestone after which green skills, green jobs and decent work would show a joint rise.

1. THEORETICAL ASPECTS OF THE CONCEPT OF GREEN SKILLS

1.1. Initial impulses for the emergence of green skills

Energy security is a product of humans' continuous pursuit of higher well-being. In the search for energy security, people have been gradually showing interest in energy efficiency. This factor has resulted in the emergence of energy conservation social concepts and practices. Thus, energy efficiency is gradually becoming one of the more significant drivers and impulses for the analysis of renewable energy sources, green growth, green enterprises and ultimately, the modern issues of green skills and green jobs.

All these concepts were initially associated with the Oil Crisis of 1972/73. In fact, the oil shock was the primary reason why the developed countries that were heavily dependent on imported fossil fuels were forced to take urgent measures to deal with the problem of rising fossil fuel prices. This was followed by a growing awareness of the crucial relation between unlimited growth and the need to protect nature and the environment from the negative human impact.

Fossil fuel shortages first identified in the early 1970s have shaken mankind's faith in what Club of Rome members label as "unlimited economic growth" (Meadows: *The Limits of Growth*, 1972). This realization incited numerous studies on natural resources limitation. Also, it was the trigger to re-examine the existing growth models in economic science. (Mesarovic: *Mankind at the Turning Point*, 1974). All this was enough for individual states and the international community to get involved in such analyses. Numerous government reports followed, first in developed countries (USA), and then in underdeveloped countries, including monographs written by experienced statesmen that attracted the interest of the international scientific community.

In the years to follow, individual countries took initial steps to adopt appropriate legislation advocating environmental and energy conservation. The application of numerous tools for evaluating and comparing alternative energy policies started. By the late 1970s, state policymakers start considering various technological options for environmental quality preservation and energy conservation in residential and commercial buildings. It becomes clear that the fossil fuel crisis has caused an irreversible and growing global concern regarding the economical use of energy resources, as well as the environment quality preservation. Numerous studies have shown that, if the classical model of economic growth practiced after the Second World War and based on the ever-increasing consumption of fossil fuels continues unabated, then humankind will bring the Earth's climate to a state that will threaten people's existence. Unfortunately, today we are witnessing that this can happen even faster than originally thought.

Consequently, we are now increasingly becoming aware that we need skills by which, in the context of everyday economic activities, we will ensure the environment quality preservation and energy saving in terms of securing sustainability. This is required to ensure more efficient production by lower energy consumption in order to reduce CO_2 emissions; then, for the production of large amounts of energy from renewable sources; and all this while taking into account the danger of climate change as a threat to the humankind survival.

Just like in many other areas, also in the case of ***green skills***, the United States is emerging as a pioneer. So, in the late 1970s the United States attempted to address urban poverty through a mass movement within communities, based on federal subsidies for urban renewal. At the same time, initial research in the field of "energy analysis" occurred. Because of this, due attention was

being paid to the interactions between energy and employment, i.e. energy efficiency was being increasingly linked to employment policies. In this way, the government indirectly stimulated the need for the emergence of green skills. Among other things, while the relationship between energy and employment continues to be refined and debated among workforce analysts, today's green skills and green jobs initiatives have reached the level of global policies associated with the needs of our increasingly expensive prospects for survival.

Theissues of environmental quality preservation and energy efficiency concern most of the sectors in any modern economy, but primarily affect the labor-intensive sectors. Thisissue offers the potential to hire a large number of unskilled, semi-skilled and skilled workers and technicians, while also attracting chronically unemployed young people. In addition, it can lead to employment and enable professional careers for highly educated staff with innovative entrepreneurial ideas in energy technologies and services, including integrated ICT automation and software, energy efficiency assessments, creative green banking, green mortgage finance and law, risk assessment and green real estate appraisal. Moreover, it can benefit individuals with innovative social and organizational entrepreneurial skills that implement partnerships and alliances of a higher complexity level between local governments, various consumer associations, construction companies, trade unions, academic institutions and secondary technical schools. These initiatives can lead to better green skill schemes, which will ultimately bring projects for greening the economy and everyday life.

1.2. Modern challenges: green economy or economy greening

The ever increasing attention to environmental and climate challenges will require a range of far-reaching policies, including for example, the development of benign technologies; enhanced efficiency in the use of energy and raw materials; critical re-examination of one's lifestyle, consumption patterns, and economic structures; the environment restoration and efforts to mitigate environment degradation. Also, adaptation of the economy and society as a whole will be required in line with these changes, which now seem inevitable and perhaps irreversible. In fact, these changes represent a kind of environmental transformation of the economy.

However, such changes cannot happen automatically. Without the initiative and encouragement by the state, they would not take place at a satisfactory speed. Subsidies, tax benefits and accounting methods allowing the "externalization" of significant environment-related costs remain the main obstacles to faster change.

Provided the contemporary environmental challenges faced by humanity that have to be overcome by a wide range of technological changes and economic transformation, it becomes clear that the issue of *economy greening* has a number of aspects and dimensions. Indeed, today there are numerous technologies, work processes, including products and services that reduce the negative impact of humans on the environment. In this way, the economy gradually becomes sustainable. However, given the environmental crisis urgency, these improvements must be very extensive. Marginal changes are therefore inadequate, because they are almost certain to be counteracted by the rapid population growth combined with the rising per capita consumption.

Green economy is an economy that does not generate pollution or waste and it is efficient in the use of necessary natural resources. If we use this approach as a benchmark, then currently, we could hardly say with certainty that any national economy fully meets these requirements. Therefore, the pragmatic approach should focus on the process, rather than on some ideal state. In that context, the emergence of *green qualifications and green skills* matching the current

changes and processes, and also corresponding to the newly emerging green jobs, should be analyzed. Green skills are gradually contributing to maintaining and restoring the quality of the environment and avoiding future damage to Earth's eco systems.

In this context, special attention is drawn to the intention of transforming towards a sustainable economy. This pursuit brings with it a higher level of complexity. Namely, now not only the state, but also the economic entities and individuals are facing the challenge of seriously changing their previous behavior. On the other hand, this necessary transformation opens up new and hitherto unknown opportunities for the economy in terms of a revolution in its business operations. This is certainly referring to the creation of green jobs and thereto related green qualifications and green skills. In fact, global economy should slowly begin to enter a state characterized by low carbon emissions as a prerequisite to deal with climate change. Such changes cannot happen without significant investments that will ensure serious technological breakthroughs, as well as new infrastructure. Also, the development and greater use of renewable energy sources and raw materials, including the use of efficient and waste-free technologies, production processes, products and services, are all crucial to the economy greening. All of this requires new skills or *green skills*, since in the meantime, there are changes taking place in existing jobs and new green jobs are being created.

The volume of literature topicalizing the issue of environmental quality preservation and employment is ever increasing in the OECD Member Countries. However, the problem is that from this large number of analyses and reports, it is not possible to arrive at aggregated results by default, because very often there is not a generally accepted approach to the green(ing) economy. Thus, very often there is no harmonized approach between individual researchers and institutions regarding the energy efficiency level or the level of renewable energy use, or organic agriculture, sustainable transport, etc. Further, it must not be forgotten that greening should also include the process of education and qualification acquisition, which will further produce green qualifications and green skills.

1.3. Transition to a green and sustainable economy

As previously mentioned, the transition to a sustainable economy characterized by low carbon emissions is a complex and comprehensive process. It implies technological breakthroughs and innovations, including changes in business and investment strategies, as well as making new policies by the state.

Economic entities (companies, enterprises) and the workforce have a significant place in the transition process. Namely, this process brings with it the creation of new and changes to existing jobs, i.e., new green jobs are created and many of the existing jobs are greened. On the one hand, this imposes the need for new green skills, and on the other hand, it results in the reduction of jobs and threatened livelihood of a large number of people in some regions and economic sectors. Consequently, there are gradually emerging analysts who point to the need for a fair approach in implementing the transition process (just transition), whereby those who are harmed by the changes shall be adequately supported, and the newly created opportunities shall be shared among workers and communities.

All of this is reflected in the work of the International Labor Organization (ILO), trade unions, national and local authorities, including individual enterprises. Thus, from a principled point of view, the costs and benefits of the transition to sustainability should be fairly distributed throughout society. Although a number of examples of a just transition can be cited, there is still a long way to go before this becomes a generally accepted norm when making individual policies.

The most important economic transitions in the past have led to significant social and economic progress for society; however, it is necessary to note that fair and just transitions have not happened very often in history. In fact, human history is full of numerous examples of serious difficulties. The most striking and recent example of this is the transition to a market economy in the post-socialist countries of the 1990s. This historical experience represents a real challenge for their upcoming global transition to a green and sustainable economy.

Greening the global economy is an opportunity for policymakers to make the right decisions. However, the greening process should be conducted within the framework of the global sustainable development paradigm, while the social dimension should be fully integrated in the economic and environmental context.

This is how we get to the situation where there is an increased need for training in a wide range of professions in the direction of acquiring green skills. This is important to prepare the workforce as a whole for the skills (and qualifications) required for green jobs and to ensure that modern sectors and national economies do not face a shortage of properly trained workers. Promoting such training is of particular importance for developing countries. Hence, it is quite understandable that various UN agencies and other international agencies (such as UNEP, ILO, UNIDO, etc.), cooperate with companies, chambers of commerce and trade unions, playing a key role in establishing green skill training centers in the developing countries.

Policymakers should look for ways to reduce the disparities between the supposed winners and losers who undoubtedly emerge in the process of transition to a green economy. The losers in terms of employment are the workers who suffer harm during the economic restructuring towards sustainability. This primarily concerns employees in the mining, fossil fuel energy extraction, and processing industries. A large number of them lack the qualifications required for the new jobs. That is why they need adequate retraining. For example, a laid-off coal miner cannot easily transfer to a job where he will install solar panels. Furthermore, many jobs in polluting industries will be eliminated. In this context, national economies and sectors that largely depend on extractive activities and polluting industries, face the challenge of their own diversification, which is necessary.

1.4. Green skills and green jobs: definition

Green skills are linked to the emergence of green jobs. Namely, green jobs require a wide range of qualifications, education and skills. They occur in research and development, then in engineering and architecture, planning and project management, but also in auditing, administration, marketing, sales and service provision to users, as well as in many traditional activities such as the installation of watersupply or electrical piping. Certainly, green jobs exist not only in the private sector, but also in the public sector (standard-setting, decision-making, permits, monitoring and implementation, support programs, etc.), including the sphere of scientific and academic institutions, professional associations, etc.

Paying an increasing attention to the environment quality maintenance and applied green knowledge is becoming extremely important in many professions. However, not all green jobs are new. In fact, it is more likely that most workplaces are dominated by less intense changes in everyday work practices and methods. Hence, conventional industrial workers can transform themselves into workers with green skills without much turbulence. For example, a November 2007 report published by the American Solar Energy Society (ASES) found that the majority of renewable energy use and energy efficiency-related jobs are standard jobs for accountants,

engineers, computer analysts, clerks, factory workers, truck drivers, mechanics, etc.[1] In fact, the majority of workers hired in these jobs may not even realize that their livelihoods depend on renewable energy sources and energy efficiency (Bezdek, 2007). The ASES study highlights that renewable energy sources and parts of the energy efficiency-related economy employ workers of all educational and skill levels.[2]

One of the critical issues in the discussion on green skills and green jobs is identified in the lack of agreement about the content of the term "green". So, the International Labor Organization (ILO) defines a green workplace in terms of "reducing the environmental impact of enterprises and economic sectors, ultimately to levels that are [environmentally] sustainable". In light of this approach, the concept of *environmental sustainability* is challenging, because in the narrower sense of the word, it is tied to sustainable economic growth achieved by using technological progress and market-based solutions. In the broader sense of the word, environmental sustainability implies *maintaining biological diversity, ensuring environmental integrity, maintaining natural capital and ensuring intergenerational fairness*.

Such ambiguity regarding the content of green skills and green jobs has resulted in attempts to nuance them. Indicative in this sense is the example of Kate Crowley who divides green jobs into three categories: deep green, mid green and light green (Crowley, 1999). The details of this categorization are shown in Table 1.

Table 1: Green Jobs Typology

	Deep green	**Mid green**	**Light green**
Mode	Proactive	Integrative	Reactive
Scope	Long Term	Intermediate Term	Short Term
Nature	Transforming	Reforming	Conforming
Objective	Redefine Growth	'Ecologize' Growth	Enhance Growth
Operation	Rejectionist	Reinventionist	Accommodationist
Aim	Ecological Sustainability	Ecological Modernity	Sustainable Development
Jobs	Preserving Nature	Greening Industry	Remedying Ecological Decline

Source: Crowley, K, 1999.

This typology is useful because it provides a framework within which green skills can be valued. At the same time, it can be noted that the light green jobs category and its aim of "Sustainable Development" is compatible with the usual approach to ecological sustainability, that is, it focuses on the pragmatic integration of environmental concern into existing sectors (for example, the automotive industry greening). On the other hand, mid green jobs require the development of a market atmosphere and technologies to "ecologically reform" the economic development, but the mid green jobs' aim of "Ecological Modernity" is achievable within the

[1] The American Solar Energy Society – ASES (www.ases.org) is a non-profit organization established back in 1954. It is the leading association in the United States when it comes to promoting greater solar energy use. Namely, ASES has more than 35,000 professionals in this area as its members and it includes numerous affiliates across the United States.

[2] A similar study led by Roger Bezdek, Ph.D., was published by ASES two years later. This study once again emphasized that energy efficiency and the use of renewable energy sources can be significant drivers of the US economy overall economic development. In this study, the focus is placed on two well-known points (which, by the way, have preserved their relevance to this day even globally): regarding the way out of the 2007/2008 US economy recession, the job-creation strategy is key, while when it comes to overcoming the climate change issue, the strategy to reduce carbon emissions by the US economy is key. The study proves the thesis that investing in higher energy efficiency and greater use of renewable energy sources can contribute to the fulfillment of both goals. Moreover, it is very significant that, among other things, the end result could bring the creation of more than 37 million new jobs by 2030 (Bezdek, 2009, p. 2).

existing social relations. By contrast, the deep green job category is focused on the proactivity component (for example, by designing and manufacturing technologies for the purpose of exploiting renewable energy resources or being socially transformative, by confronting capitalism's essential drive for growth). The deep green jobs' aim of "Ecological Sustainability" ultimately requires the development of alternatives to the existing social relations and their ecologically destructive character.

In this way, we go back to the initial dilemmas surrounding the specific content of the terms "green skills" and "green jobs". This issue is still highly contested in literature. Despite the well-known fact that green skills and green jobs are related to the environment improvement, protection and preservation, there is no agreed framework yet as to the determination of their main features. Therefore, in order to define more accurately the content of the term *green skills*, it is required to consider some broader and more fundamental concepts of what is meant by the term "green". Individual theoretical approaches point to the following areas:

- *Environmental Sustainability* – skills and practices that contribute to the long-term quality of the environment, such as environmental protection and preservation, pollution control, waste disposal, natural resource management, etc.;

- *Green Economy* – skills related to reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing energy efficiency, recycling materials, as well as using renewable energy sources (Dierdorff et all., 2009);

- *Green Industry* – skills and qualifications required for employment in companies that make green economy-related products or services;

- *Green Professions* – occupations (or adequate qualifications and skills in their context) that support the production of green products and services, or processes "greener" than the previous ones, regardless of whether the company produces green products.

As we can see, when determining the content of the green skills term, we take the definition of green jobs as a benchmark. It is therefore important to look at what the literature has to offer in this sense. One of the generally accepted approaches talks about three inter-correlated definitions of green jobs. There, each of the definitions in some way helps to promote a particular framework of what is to be considered a green job. In this case, it is about *industrial*, *occupational* and *normative* viewpoints, which are systematized as follows:

- *Industrial definition*: work is essential to products and services that improve the environment and/or the job includes work in a green economic activity. (Gregson, 2010);

- *Occupational*: the extent to which green economic activity and technology shape the demand for certain occupations and working conditions. (Dierdoff et all, 2009);

- *Normative*: jobs that improve the environment and provide good wages, equal opportunities and a way out of poverty. (Woods, 2009).

The fact that these three definitions are also operational in terms of green skills is very significant. Namely, green jobs are those that are related to certain sectors or industries, such as the sector using energy from the sun (solar industry). In this case, green is described as a process by which existing jobs are supplemented with new specialized qualifications and skills that enable the performance of new green work.

As for the situation in our country, it should be underlined that a few years ago, more specifically in March 2018, the Government identified the need and formed a working group that

identified the potential of green jobs in Macedonia and proposed their official definition.[3] "The working group accepted a definition of green jobs that is in line with internationally accepted definitions, but is adapted to national conditions and is (to be) treated as a nationally accepted definition. The definition of green jobs reads: *Green jobs include decent jobs that contribute to social equality and the preservation, restoration and improvement of the environment and climate*." (Jovanovski A., p. 53).

In this green jobs' definition, two aspects were emphasized: the aspect of contribution to a higher quality of the environment and the social aspect (green jobs should ensure decent conditions for the employee's livelihood). Regarding the first aspect, according to the definition, green jobs should contribute to the: more efficient resource use, waste reduction and management, reduced air pollution, ecosystems' protection and restoration, reduced greenhouse gas emissions, adaptation to climate change effects, and enhanced energy efficiency. Regarding the second aspect ("decency" and social equality), these jobs should: ensure a solid income for the worker, job security, families' social protection; enable personal development and social integration; provide space for free expression of one's work concerns; allow workers to get organized and participate in any decisions affecting their lives; ensure equal opportunity and treatment for all men and women. "It was determined by the working group that in the coming period the most sought-after green jobs will be those in the energy sector and the use of renewable energy sources, as well as those in the construction sector required for the construction of energy-efficient buildings." (Jovanovski A., p. 54)

Certainly, there are opposing viewpoints found in literature, which deny the need for green skills' emergence. Thus, there are examples cited from practice, according to which certain employers claim to have created completely new jobs, when in fact they had the need for enhanced specialty skills to be added to the core functions of their existing jobs and occupations. Even some renewable energy sector employers working with manufacturers of advanced new wind turbine blades, recognize that training and certification of repair technicians in this new green occupation requires only a core set of mechanical and trade skills that already exist in the labor market. However, such empirical examples can only be treated as exceptions which confirm the main premise that the emergence and creation of green skills is strongly linked to the economy and society's transition towards sustainability and green jobs' emergence.

A decade ago, the European Centre for the Development of Vocational Training (Cedefop), in its report entitled *Green skills and environmental awareness in vocational education and training*, offers an extensive analysis of trends, shortcomings and future needs in a range of occupations designated as suitable for creating green skills. The report covers 8 EU Member States back then, including: Germany, Greece, Italy, Hungary, the Netherlands, Slovakia, Finland and the United Kingdom. What is of particular importance in this case is the fact that the back then launched definition of green skills has been taken as a reference in all further research and studies under the auspices and initiative of Cedefop up until today. Namely, according to Cedefop's research and analyses, *green skills* as a term refers to "the abilities, values and attitudes needed to live in, develop and support a society which reduces the impact of human activity on the environment." (European Centre for the Development of Vocational Training, 2012, p. 20).

Finally, it can be stated that the definition of green skills should be based on the criterion according to which it is a job that refers directly to the production or delivery of green products or services related to the green economic activity categories. The most common terms relate

[3]At the initiative of the Go Green Association, the Government of the Republic of Macedonia, at its 59th session (2018), made a decision to establish a working group for green jobs in order to address youth unemployment. The working group was mandated to adopt a definition of green jobs and map them according to the National Occupational Classification. The working group was coordinated by the Ministry of Environment and Physical Planning, and it had representatives of: the Ministry of Education and Science, the Center for Vocational Education and Training (CVET), the Ministry of Labor and Social Policy, the Agency for Youth and Sport, the Go Green Citizens' Association, the Cabinet of the Deputy Prime Minister for Economic Affairs, the State Adviser on Climate Change at the Ministry of Environment and Physical Planning and the Project Coordinator of the Fourth National Report on Climate Change. Representatives from the RNM Academy of Sciences and Arts, the Center for Adult Education, the United Nations Development Programme, Swisscontact, the RNM Employment Service Agency, the RNM Chamber of Commerce and the Department of the Environment of the City of Skopje were included as additional collaborators.

to environmental and energy issues, including: conservation, cleanup, use of alternative energy sources, and energy efficiency. In fact, it is about the shared elements that stand out when talking about green economy definitions. Below is a list of proposed green economic activity categories.

Table 2: Proposed Green Economic Activity Categories

Green economic activity	Activities included (but not limited to)
Renewable energy sources and alternative fuels	Processing, manufacturing, construction, design, research, delivery, operation, storage and maintenance of wind, solar energy, biomass, hydro-energy, alternative transportation fuels, geothermal energy, methane, and waste incineration as a fuel source.
Energy efficiency and conservation	Manufacturing, construction, installation, production of energy efficient products, energy efficiency services, weatherization, building retrofitting/efficiency, energy efficient production processes, energy distribution improvements (smart grid), transportation technology, and battery development and storage improvement.
Pollution, waste, and GHG emission management, prevention, and reduction	Activities related to controlling commercial, transportation, and industrial emissions and pollution; water treatment, recycling operations, waste management and treatment. Includes controlling and reducing emissions of CO_2, other greenhouse gases, waste water, and other pollutants.
Environmental cleanup and remediation, and waste cleanup and mitigation	Environmental remediation including the cleanup and disposal of pollution, waste and hazardous materials; Superfund/Brownfield redevelopment; and landfill restoration.
Sustainable agriculture and natural resource conservation	Products and services to conserve, maintain, and improve natural resources and environment, including low carbon agriculture, land management, water management and conservation, wetlands restoration, and environmental conservation.
Education, regulation, compliance, public awareness and training, and energy trading	Activities to educate the public, business, and government on energy efficiency, renewable energy sources, energy rating systems certification, and more efficient energy consumption. Also, informing appropriate parties about enforcing compliance requirements and regulations, promoting state energy standards and plans, and training on effective use of energy related products and processes. In theory, energy trading could include buying and selling of power or fuels related to energy efficiency and renewable energy, as well as cap and trade activity to control pollution.

Source: Workforce Information Council – Green Jobs Study Group, Final Report, 2009.

This is a framework of green economic activities. With its help, a functional definition of green skills could be established. Therefrom, the following could be proposed as a measurable definition: ***A green skill*** *is one that serves the purpose of providing products or services that improve energy efficiency, expand the use of renewable energy sources, or support environmental sustainability*. Such skills give the basis for performing work in any of the green economic activity categories: use of renewable energy sources and alternative fuels; energy efficiency and conservation; management, prevention and reduction of pollution, waste and greenhouse gases; environmental cleanup and remediation, and waste cleanup and mitigation; sustainable agriculture and natural resource conservation; education, regulation, legal compliance, public awareness and training, and energy trading.

The economy orientation towards greater sustainability (will) affect(s) the workforce in several ways: first, in certain cases, additional jobs will be created that would require new green skills; second, some jobs will be replaced (for example, in the transition from using fossil fuels to using renewable energy sources, or from waste landfilling and incineration to waste recycling, which would again require advanced (green) skills); third, it seems that many of the existing jobs (plumbers, electricians, metal workers and construction workers) would simply be transformed and redefined as their day-to-day qualifications and skills are being "greened". It goes without saying that certain jobs could be eliminated without being directly replaced – for example, due to the fact that some packaging materials would be discouraged or banned, while their production is discontinued.

1.5. Dilemmas concerning the research on green qualifications and skills

Although a number of studies indicate that most green jobs do not require significantly different qualifications, many do require some on-the-job training or special training in certain skills. On the other hand, none of the studies carried out so far globally have identified new green jobs resulting from the emergence of a completely new profession.

The main goal to be realized through a survey is to define *green skills* and describe what should be measured in them. Such survey should identify and highlight the issues and questions surrounding the green skills' measurement:

- What is the *specific framework (definition)* of green skills, provided the objectives of workforce and economic development policy analysis? Could this definition be used for measurement purposes?
- Are green skills concentrated in certain groups of sectors or professions, and if so, in which ones?
- Are all sectors and professions "green"? If so, what are they and can they be identified as such within existing classification systems?
- What proportion of jobs in certain sectors or professions require green skills? Could this be measured?
- What are the mandatory education and training requirements of green jobs? Are they similar to those of "non-green jobs"?
- What kinds of skills are required by green jobs and how are these similar to or different from skills required by other jobs? Are these skills obtained through relatively short-term training of workers in existing or related occupations, or do they require longer specific training?

An implicit, and sometimes even explicit, assumption in many studies is that there is an unlimited supply of labor that will be willing to fill green jobs. While this may be the case for unskilled construction jobs that are temporary, filling some skilled jobs could be much more difficult. The existence of various training programs in wind energy, solar energy and biofuel activities indicates that there is a need to develop additional skills. Attracting experienced workers for such positions may be more difficult.

With all this in mind, it can be concluded that there is a high level of uncertainty surrounding the green skills assessment, partly because different definitions are used. In addition, the

estimates in individual studies vary considerably because in most cases different models are used to estimate the skills necessary for individual jobs. In a sense, many studies are actually cost-benefit analyses without adequate cost considerations.

Such studies argue that investing in these technologies would create more jobs and demand for new green qualifications and skills than investing in conventional energy sectors. However, one should be careful in drawing any conclusions, as this would be relevant only if more labor is required per penny (denar) of investment, compared to the conventional technologies to be replaced. This argument is problematic from an economic point of view, because it implies lower productivity and hence, higher labor costs, with a simultaneous negative impact on households' consumption basket and reduced companies' competitiveness on the global market.

Some alternative technologies may in part be more expensive than established technologies due to the lack of economies of scale, and their costs may decrease over time through their commercialization. Also, the mitigation of some of these cost disadvantages via incentive programs may be justified based on the environmental and diversification benefits that green technologies may provide. But if they are labor-intensive to a higher extent and are likely to remain so, their cost disadvantage compared to established technologies may become permanent. In this sense, the wind power generation costs, which have been decreasing continuously over the years, have suffered an inflationary blow during the last decade. Promoting green technologies in terms of creating green skills and green jobs may actually undermine their expansion.

1.6. The state, green skills and green jobs

1.6.1. Green skills and green job creation

Creating green jobs means providing new work engagements for people while diverting the resources from one sector to another in the economy. If a green job is seen as a net benefit, then the value created by such job for consumers has to be greater than the cost of performing the job. Actually, the opposite is often argued, i.e., that more work is required to provide the same amount of energy. This is precisely what certain analysts present as a benefit. Energy itself is a benefit, but the work done in obtaining energy is a cost that we benefit from only by minimizing it. The green jobs literature is riddled with this misunderstanding.

Many reports mistakenly claim that the cost is actually a benefit. Put in simple terms, the economy values services and products provided when workers have performed some work, rather than the actual performance of such work. The labor (work) invested in the workplace is an expense. It has to be incurred in order to obtain some benefit. In fact, people generally prefer leisure to work; however, work is why employers pay employees and not vice versa!

1.6.2. Drivers creating green skills and green jobs

Market forces and voluntary initiatives and investments will not be enough to turn green potential into reality, much less at the speed needed to meet climate change and other environmental urgent needs. So, despite the above, all the individual states' previous policies will continue to be necessary. They are important for: securing finance for green projects; setting long-term and more comprehensive goals and standards than those typical of the business world; providing infrastructure that the private sector cannot or will not create; and creating and maintaining a level playing field competition for all participants.

In view of the environmental crisis, and particularly the climate change threat, there is an urgent need for economies around the world to become much more sustainable and to rethink the current production and consumption model. Concepts such as dematerialization, remanufacturing, "zero waste" closed-loop systems have been discussed for some time and tested in a number of cases, but have yet to become reality on a large scale.

National economies able to churn out huge volumes of products but that require less and less labor to do so, pose a dual challenge in terms of their impact on the environment and unemployment. In the future, not only do qualifications and jobs have to be greener, but their very essence may need to be redefined. A number of countries and companies are grappling with proposals to reduce the working hours of individuals in order to provide more jobs accessible to all those who are willing to work, but cannot find work.

1.7. International experiences in green qualifications and skills

In modern terms, a large number of case studies from highly developed countries of Europe and the USA indicate that in order to achieve real functionality of the modernization potential aimed at achieving energy efficiency in office buildings (building energy efficiency retrofit - BEER) and modernization to achieve energy efficiency in residential buildings (residential energy efficiency retrofit - REER), it is required to organize *retraining and upskilling* of the workforce in order to be able to provide more complex and new green qualifications and skills. For this purpose, curricula, job descriptions and required qualifications should be elaborated, while considering not only the specialization required for any specific job and control of activities for achieving modernization and energy efficiency, but also starting in parallel with the preparation of communication specialists and training of future trainers.

In its recent technical report (January, 2022), entitled as *Green Skills and Knowledge Concepts: Labeling the ESCO classification - Technical report*, the European Commission, departing from its 2019 European Green Deal, clarifies the updates made to the European Classification of Occupations, Skills ad Competences – ESCO. Namely, monitoring the economy and ensuring adequate professional mobility facilitates the transition towards meeting the labor market needs for an environmentally sustainable society. The transition to a green, low-carbon and efficient economy is both a challenge and opportunity for the European labor market. Policies directed to providing conditions for the creation of new skills actually aim to bridge any skills gaps and better predict skills needs across sectors and branches. With this in mind, the publication of the updated version of the European Classification of Occupations, Skills and Competences (ESCO v1.1), was another step further to supporting the labor market green transition. It is interesting that all occupations covered by the ESCO classification, from a methodological viewpoint, were divided into three groups (European Commission, 2022, p. 4), as follows:

- Brown Skills - skills that increase human activity impact on the environment;
- White Skills - they neither increase nor decrease human activity impact on the environment; and
- Green Skills - they reduce human activity impact on the environment.

Based on the preferred term and description of either a skill or knowledge, a brown, white or green designation was assigned to a particular concept in the analysis. Thus, 571 skills and knowledge concepts within the ESCO classification were marked as green.

In this regard, it is interesting that even legal and economic secondary schools, in cooperation with universities, often introduce new curricula with the aim of reshaping and transforming existing qualifications in the framework of industrial sectors' labor occupations, while also including employee competencies in banking, insurance, real estate and law firms regarding the new instruments and features of this novel and large market.

There is no need to underscore the fact that in line with the international experience, an increasing number of curricula are becoming subject of greening. Namely, in the near future, not only certain occupations (such as construction occupations) will be associated with greening processes, but also the new green qualifications and skills will find their implementation in municipalities (local government), governments (central government), utility companies, credit institutions and academia.

Certainly, these processes are particularly relevant for *small and medium-sized enterprises*. This is confirmed by the numerous initiatives of the American Government (USA) and the European Union (EU), within which respectable amounts of "green money" are allocated to stimulate innovative applied research among small and medium-sized enterprises in the sectors of energy efficiency and renewable energy resources. Considering the above, small and medium-sized enterprises and construction-related sectors are not the only entities to be identified for upskilling, transformation and innovative qualification of their workforce in terms of acquiring green skills and qualifications. In that direction, almost all universities and faculties (of business, law or technology) need to redesign their study programs in order to enrich their offer, that is, to offer additional specific green skills courses. In doing so, special attention should be paid to talented students who have demonstrated research results and are undertaking entrepreneurial activities related to their innovative ideas for products and services that are either directly or indirectly related to the promotion and maintenance of energy efficiency, environmental quality preservation and realization of the sustainability concept in practice. In this sense, it can be underlined that "experts in higher education have started mapping specific sustainability competencies for students and professionals to become change agents for sustainability. Although there is widespread agreement in literature on what necessary sustainability competencies are to be adopted and embedded in lifelong learning programs, this still remains the responsibility of individual institutions. In addition, the research conducted so far tends to deal primarily with higher education, focusing on what competencies young graduates and professionals need to possess in order to contribute to sustainability challenges and opportunities." (Bianchi G., Pisiotis U., and Cabrera M., 2022, *GreenComp - The European sustainability competence framework*, p. 12.) There, it is important to keep in mind that all forms and types of learning (formal, non-formal and informal) are considered as vectors for the development of this competence. Sustainability-related competencies or sustainability as a competence applies to all spheres of life, both on a personal and collective level.

1.8. Green skills and education

1.8.1. Concept and meaning of "green" skills from the educational process viewpoint

In the 21st century, global population is exposed to complex challenges such as climate change, economic inequality, overconsumption and poverty that create the need for global change. To overcome the issues facing humanity, there is a need for all members of the global community to make a change in their attitudes and behaviors and to adopt a way of living that would be based on sustainability and efficient use of resources at local, national and global levels.

In the current environmental conditions, a need arises for permanent education on sustainability in all of its aspects. Basically, sustainable development is achieved by applying technological solutions, policy regulation and financial instruments. Also, there is a need to change the way of thinking and acting of each individual in the global community, which can be achieved by quality education on sustainable development at all levels and in all social contexts.

Globally, every individual should continuously improve their knowledge, awareness, understanding and skills in order to contribute to finding solutions to the most sustainability-related issues. In this context, all levels of education contributing to the acquisition and/or improvement of knowledge and skills as a basis for alternative thinking and innovative ideas to deal with social and environmental challenges at the local and global level are important.

"Green" economy as a new economic paradigm aims at environmental protection based-development. Here, it is important to emphasize that the economy "greening" does not hinder wealth creation or employment opportunities. Also, any job or activity can potentially become "greener". Therefore, understanding the impact of work (profession, occupation) on the environment and its possible contribution to "greener" economies should be included in the content of any education and training.

New jobs are established in "green" sectors, which is why it is required to redefine a number of current professions. The demand for new skills is increasing, which is why the formal and informal education and training content needs to be adapted and contribute to a well-educated and trained workforce.

Integration of sustainable development and environmental issues into existing educational and professional qualifications on the one hand, and new competence acquisition needs related to the "greening" of the labor market on the other hand, is a process of great importance. Understanding the impact of one's profession on the environment should be included in the subsystems of the education and science system. Therefore, sustainable development and environment-related issues in existing qualifications need to be integrated towards the promotion of building new such skills in both formal and informal education.

According to the 2030 Agenda for Sustainable Development, education, skills, attitudes and behavior of every individual are key to human capital sustainable and inclusive growth and development.[4] This was also concluded in the UNESCO's 2016 Global Education Monitoring Report, which emphasizes and confirms the role of education in every dimension of sustainable development.[5]

[4] https://sdgs.un.org/goals, accessed on 20 March 2022.

[5] https://en.unesco.org/gem-report/taxonomy/term/, accessed on 24 March 2022.

On the other hand, the 21st century education faces the challenge of preparing individuals that would be competitive in the labor market. The four "C" skills refer to communication, creativity, collaboration and critical thinking. The role of each country is through its formal and informal education to prepare generations with knowledge about "green" technologies equipped with various skills required for the global society.

Schools have a responsible role and contribution to environmental sustainability. Especially in secondary education, it is necessary for students to be prepared for the generic "green" skills and environmental awareness that they would acquire in the educational system, as indicated by the results of the research on the linkage between awareness, knowledge and practices of secondary school students in terms of waste management. (Ayodei I., 2008, p. 201-215).

Education is faced with the challenge and responsibility to prepare students for both the present and the future, i.e., to produce generations of creative, more knowledgeable, better educated, ethically responsible individuals, and also to identify and replace harmful practices with useful ones; to strengthen the problem-solving and critical thinking abilities in society; to raise students' level of awareness and develop students' competence for continuous adaptability and meet the need for learning and exploring new visions, concepts and innovative solutions.

"Green" skills are basically soft skills that emphasize the concepts of environmental sustainability, energy saving and proper use both locally and globally. "Green" skills should be learned, applied and promoted throughout the educational process, particularly in primary and secondary school, when awareness of and behavior towards the environment is created. They are primarily necessary for every individual who, by studying and applying them, acquires added value and thus becomes more competitive in the global labor market.

With "green" skills, the abilities, values and attitudes required for each individual to behave responsibly regarding the sustainable and effective use of resources at their workplace are developed. This enables each individual to adapt to the issues arising due to climate change and the environment, i.e., to behave responsibly in terms of sustainability. "Green" skills are acquired through a process of improving one's knowledge, ability, values and attitudes required for coexistence in sustainable communities where everyone should become more responsible and strive for the efficient and sustainable use of available resources.

According to the European Centre for the Development of Vocational Training (CEDEFOP), it is necessary to have a better cohesion between education and training, and the labor market.[6] "Green" skills should be taught and thematically included in both informal and formal education. In secondary vocational education, it is required to study different aspects, such as the usefulness of environmentally responsible behavior, the application of different materials in the recycling process, the matching of skills with "green" technologies in terms of sustainability, etc.

[6] https://www.cedefop.europa.eu/en/country-reports, accessed on 7 April 2022.

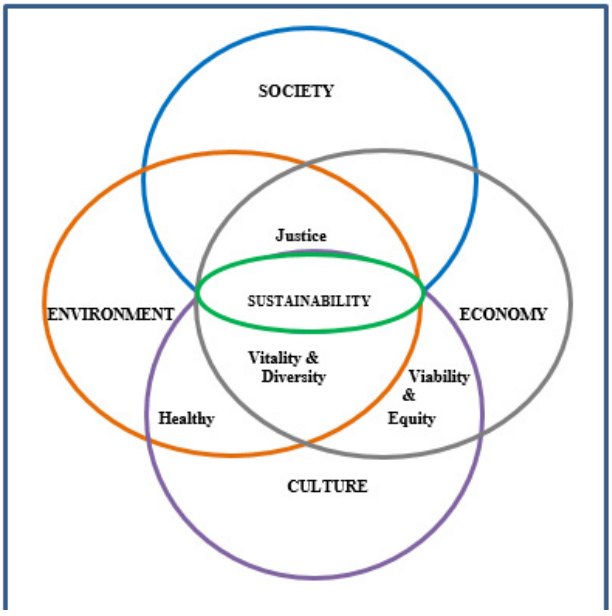
1.8.2. Acquiring "green" skills – experiences, opportunities and challenges in education

The rapid development of industry and other economic activities undoubtedly causes a series of destructive effects on the environment. That is why there is a need to present green technologies as content in curricula during the period of transformation of conventional economy into a green economy. According to some considerations, education and training should focus on the skills acquisition in the educational process and address a range of issues and problems such as pollution, urban development and transport. To this end, new innovative educational contents are required, which would serve the purpose of raising the awareness and knowledge about how to mitigate the negative impact of pollution. (Arasinah Kamis, et all., 2017, p. 332)

The 2016 Global Education Monitoring Report highlights the role of education in every segment of sustainable development.[7] Education for sustainable development (ESD) is the process of learning how to make decisions that take into account the long-term future of the economy, ecology, development and promotion of different cultures. Throughout the education process, students' perspectives and attitudes towards sustainability are enhanced and students' motivation for transformation into persons who will contribute to higher public awareness and commitment to the sustainability concept is developed. Through education, knowledge, skills, including values and competencies, are developed for sustainable activities that contribute to a better quality of life without destroying the environment for future generations.

Sustainable development education is the process of learning how to make decisions that take into account the long-term effects of human actions on the environment, promote the diversity of cultures, values and beliefs, equitable and green economic development, as well as social justice (Figure 1).

Figure 1. Four Cornerstones of Sustainability



Source: Frida Agbor Besong, BA, MA, MIR., *"Infusing Sustainability in Higher Education in Ireland: The Green Curriculum Model (GCM) and the Dispositions, Abilities and Behaviors (DAB) Competency Framework"*, School of STEM Education, Innovation & Global Studies, July 2017, Figure 1. Four Cornerstones of Sustainability p. 10.

[7] https://en.unesco.org/gem-report/taxonomy/term/, accessed on 24 April 2022.

The use of a tripartite system, including governments (states), forward-looking businesses and organized labor, can initiate changes and innovations in the education system to draft curricula that meet the needs of companies and individuals in society.

Education and skills acquired shall provide the key tools, such as economic, social, technological and behavioral ones, required to undertake the Sustainable Development Goals (SDGs) and achieve them.[8] Within the 17 Sustainable Development Goals, there is a connection between Goal 4 entitled *Quality Education*, which should ensure inclusive and quality education and promote lifelong learning opportunities for all, and the other 16 Sustainable Goals of Agenda 2030 (Maclean R., Shanti J., Brajesh P., 2018, p. 12), that is with:

- Goal 1: Education is key to lifting people out of poverty.
- Goal 2: Education plays a key role in more sustainable farming methods and understanding nutrition.
- Goal 3: Education can make a crucial difference to a range of health issues, including early mortality, reproductive health and the spread of disease, healthy lifestyles and well-being.
- Goal 5: Education for women and girls is particularly important to achieve literacy, improve participatory skills and abilities and improve life prospects.
- Goal 6: Education and training increase skills and capacity for more sustainable use of natural resources and can promote hygiene.
- Goal 7: Education programs, both formal and informal, can promote better energy conservation and utilization of renewable energy sources.
- Goal 8: There is a direct link between areas such as economic vitality, entrepreneurship, labor market skills and education levels.
- Goal 9: Education is necessary to develop the skills required to build more resilient infrastructure and sustainable industrialization.
- Goal 10: Where equally available, education makes a difference in social and economic inequality.
- Goal 11: Education can give people the skills to participate in shaping and maintaining more sustainable cities and achieve resilience in disaster situations.
- Goal 12: Education can make a key difference in production patterns (such as in terms of circular economy) and in consumer understanding of more sustainably produced goods and waste prevention.
- Goal 13: Education is key to understanding the impact of climate change on adaptation and mitigation, especially at the local level.
- Goal 14: Education is important for developing awareness of the seas and building a proactive consensus regarding their sustainable use.
- Goal 15: Education and training enhance skills and capacities to support the

[8] According to the 2019 Human Development Report, Sustainable Development Goals (SDGs) are 17 global sustainable development goals for the environment, society and economy. Also known as the Global Goals, they were adopted by the United Nations member states in 2015 as a universal call to action to end poverty, protect the planet and ensure peace and prosperity by 2030 (Human development report 2019, https://www.undp.org/content/undp/en/home/sustainable-development-goals.html, accessed on 10 March 2019.

sustainability and conservation of natural resources and biodiversity, especially in threatened environments.

- Goal 16: Social learning is vital to facilitating and ensuring participatory, inclusive and just societies, as well as social coherence.

- Goal 17: Lifelong learning builds capacity to understand and promote sustainability.

"Green" skills are required to produce competent individuals, as indicated by a number of examples and experiences in different countries. By acquiring these skills, individuals become competitive having "green" characteristics and the ability to maintain ecological balance both locally and globally.

The education system is the best platform that can accommodate the learning of generic green skills by students. In this regard, in the world and among developing countries there are already examples of countries where a step has been taken to include green skills in education, although the issue of inconsistency between educational and economic policies arises.

For example, the Sri Lankan government leads a proactive and straightforward education policy and has institutions that include both generic and specific green skills in their curricula and courses, as well as active engagement with industry to provide continuous feedback on curriculum reforms. Also, it is expected that the demand for such skills will increase in the medium and long term.

In Malaysia, for example, there is an educational plan including a human capital development agenda, and application and development of ever-improving green technologies, which is crucial to the introduction of green skills in secondary education curricula. Curriculum content covering green skills should be linked to green technologies. The role of secondary schools is not only to provide knowledge to students, but also to contribute to environmental sustainability in the best possible way. (Arasinah K., et all, 2017, p. 340).

A new system is being introduced in the UK to identify skills needs and articulate them as a basis for education and training responses at the regional level through regional development agencies and sector skills councils, with the aim of better understanding industry needs. The UK has established a Commission for Employment and Skills to carry out an annual strategic skills review and identify employer needs in priority sectors.

Examples in some EU Member States such as Denmark, Germany and Estonia show that skills development is effectively implemented by organizing mostly academic and professional courses for vocational education and training, internship and other initiatives embedded in the formal education system. So for example, in Germany, the integration of environmental aspects has had a strong impact on the German education and training system in recent years. Environmental protection is also included in dual vocational training (dual education) and university education, and new courses have been introduced for initial (pre-service) training and university studies.

Basically, teenagers and young people need continuous education about environmental sustainability, so therefore, educational institutions' goal should be to educate future employees with green knowledge and skills. Notably, green jobs require green skills and knowledge serving the purpose of developing a "green" economy, public awareness of environmental issues and sustainable development. In secondary education, it would be most adequate for students to first acquire knowledge about green skills and green technologies, before moving on to a higher level of education. Once these students with acquired green skills move to a higher level of education, they would be able to apply what they have learned and translate their knowledge into activities and processes that would result in their greater competitiveness for green jobs.

In addition to general knowledge about green skills and technologies, in secondary vocational education, students should acquire applicable technical (operational) skills that would increase their competitiveness on the labor market.

Unfortunately, a large proportion of students are still not sufficiently aware or properly educated about environmental issues and challenges. Therefore, it is necessary for education to be involved in solving global environmental issues and to contribute to preserving the planet for future generations. In addition, it is required to develop media coverage for a series of important issues in order to educate and raise awareness among students about sustainability, green skills and environmental protection.

Skills development is crucial to increasing employment potential and green growth, yet education and skills acquisition policies are not sufficiently aligned with environmental policies. It is therefore necessary for national governments and line ministries of education to develop strategies for social dialogue and coordination between ministries, and between employers and providers of education and training services.[9]

Students should be offered integrated curricula covering contents that will develop and upgrade green skills in everyday life. In addition to upgrading educational content, national governments can promote green practices, which in the medium term would contribute to reducing the use of non eco-friendly materials and products such as styrofoam, non eco-friendly plastic containers, minimum use of plastic bags, etc.

In secondary vocational education, it is required to create and integrate environmental contents through a process of both theoretical and practical education and application of experimental methods in teaching, especially in the part that takes place at companies/with employers, which would increase students' innovation. By such approach in curricula creation and implementation, students become more aware of the usefulness of existing resources and are able to integrate them into their future professions in a creative way. One example includes knowledge and practices of used material recycling, which are particularly important to be developed among students. Recycling of unused materials can save the environment and help apply "green" practices in everyday life.

The knowledge of "green" skills would contribute to the creation of highly qualified human capital that would impact sustainable growth and "green" technologies through its activities. These skills are needed for the education and training of a workforce that would be able to support social, economic and environmental conditions for the development of businesses, the economy and social community. Acquiring "green" skills should include every individual, product, service or process in order to mitigate the climate change problem and protect the environment according to specific requirements and rules of conduct. (Sarsvathy T., Ramlee M., 2020, p. 164).

It is necessary for national governments to undertake initiatives regarding "green" practices. A commitment to clean and "green" growth requires "green" professionals in various fields who, through the process of education, would become empowered to adopt these practices as a way of life. Unfortunately, educational institutions in a number of countries still lack effective strategies for "green" jobs and have not responded to the skills challenges related to environmental issues and climate change, so as a consequence, they have not developed coordinated activities for education, training and workforce green skills readiness.

[9] https://www.ilo.org/global/publications/books/WCMS_159585/lang--en/index.htm, accessed on 4 May 2022.

ANALYSIS OF THE
GREEN SKILLS SITUATION

2

ENVIRONMENT FOR CREATING GREEN QUALIFICATIONS AND GREEN SKILLS IN THE REPUBLIC OF NORTH MACEDONIA

2. ENVIRONMENT FOR CREATING GREEN QUALIFICATIONS AND GREEN SKILLS IN THE REPUBLIC OF NORTH MACEDONIA

2.1. Current macroeconomic conditions and trends

Despite the numerous turbulences and shocks of an economic and non-economic nature, in the period since its independence up until today, Macedonia has recorded an economic growth with an average annual rate of 3.5% in the 2000s and 2.5% in the 2010s. However, the low employment growth intensity (an average increase of 1.7 percentage points in the ratio of the number of employees to the total population in the 2011-2019 period compared to the output growth of 2.7%) slowed down the convergence of the gross domestic product (GDP) per capita towards the EU Member States' average. In 2019, the national GDP per capita was 38% of the EU-27 average (2020). Employment and output growth started converging only after the 2008 crisis. According to numerous studies, the Republic of North Macedonia should achieve a sustainable growth rate of 5% per year in order to reach a GDP per capita equivalent to the EU average by 2050. (*National Employment Strategy 2021-2027*)

Macedonia has a positive business environment. According to the World Bank's Doing Business 2020 Report, Macedonia has the highest cumulative business environment index compared to the countries in the region, and it stands out particularly in the area of minority investors' protection and dealing with construction permits. There is certainly room for improvement in other categories. In such circumstances, expectations are justified that any future investments, including investments in the energy sector (especially renewable energy sources - RES and energy efficiency), can have a positive impact on reducing the unemployment rate and on the economic growth. Otherwise, foreign direct investments in the Republic of North Macedonia amount to an average of 225 million EUR per year or EUR 107 per capita, which is significantly lower than the region. (*4th National Action Plan for Energy Efficiency - 2020-2022*, p. 12-13)

An important segment of the favorable business climate is the low rates of profit tax and personal income tax (a flat rate of 10%), complemented by a range of fiscal exemptions for reinvested profits. These measures were created in part to ensure conditions where the labor force in our country would remain competitive within the European framework. However, it should be noted that during 2019, progressive personal income taxation was introduced, but the following year (2020) it was frozen and the flat tax was upheld again.

The payroll tax reforms were expected to mitigate the difficulties in hiring and retaining employees. In this sense, social security contributions were also reduced, that is, from 32.5% of the individual's gross income in 2008 to 27% in 2010. These reforms were complemented by a transition from the concept of net salary to using gross salary as a basis for calculation of social contributions. From today's perspective, it can be said that with the exception of 2019, these reforms have had a positive labor market impact.

In terms of distribution by sector, slightly more than a third of active enterprises are in the wholesale and retail trade sector; manufacturing (11%); transport, storage and communications (9%); and construction (6.1%). These sectors make up more than three quarters of the total number of active enterprises and 65% of employees are engaged in them. The number of active enterprises in agriculture (including forestry and fishing) accounts for about 4%, of which 90% are micro enterprises (with 1-9 employees). The lowest representation by number of active

enterprises, with 0.2% each, have the following sectors: mining and quarrying; and supply of electricity, gas, steam and air conditioning (*Report on Strategic Environmental Assessment of the Program for Implementation of the 2021-2025 Energy Development Strategy*).

Small and medium-sized enterprises (SMEs) represent almost the total number of enterprises in Macedonia (99.7% in 2017). They are important in terms of job creation, as on average, over 80% of total employment is in SMEs. In addition, micro-enterprises represent 90% of registered economic entities and employ more than 30% of all workers. The fastest growing sectors for SMEs in the country in the 2012-2017 period were information and communication technology, and professional activities. (*National Employment Strategy 2021-2027*)

North Macedonia has the second highest unemployment rate in the region; however, it has been showing a positive trend over the years. In addition, employment is characterized by an unfavorable gender structure. It has been unchanged for a longer period due to the unstable economic and social conditions, but also as a result of the imbalance between available and required profiles on the labor market. The employment rate for women in 2019 was 48.4% and it was positioned below the employment rate for men, which was 69.7% of the active population aged 20 to 64. (*4th National Action Plan for Energy Efficiency 2020-2022*, p. 11)

The poverty rate in the entire period averages 30%. It reaches the highest value of 31.1% during the 2009 economic crisis. Overall, poverty is conditioned by the high unemployment level. The most vulnerable groups in terms of poverty are multi-member households with 5 or more members, or about 40% of households. (*Report on Strategic Environmental Assessment of the Program for Implementation of the 2021-2025 Energy Development Strategy*)

In the last 15 years, the Macedonian educational system, primarily its secondary education, has been undergoing continuous changes. The key challenges were related to increasing the enrollment rate. Namely, in the 2004-2008 period, the enrollment rate in secondary education went up from 85% to 95%, while the primary education dropout rate was reduced to less than 2%.

2.2. Strategic and legal aspects of the process of creating green skills in the Republic of North Macedonia

The Republic of North Macedonia, as an EU membership candidate country, has been facing the challenge of effectively implementing serious reforms in its social system for more than a decade and a half. In the context of these reforms, the reforms in the field of environmental protection, sustainable development and energy efficiency are crucial to the development of the country.

Considering the above, the main *goal* of this research segment is to analyze individual strategies, and then after that, the respective legislation and regulations in order to find out whether they either explicitly or implicitly contain any parts that could be of importance to the creation of green skills and/or green jobs in the Republic of North Macedonia.[10] Namely, it is about analyzing strategies, reports and legal documents that possibly contain elements indirectly contributing to the creation of an atmosphere for green skills emergence.

[10] This is primarily about strategies aimed at environmental protection, sustainable development and other strategies related to these issues.

In addition, this section also reviews strategies and programs related to economic development, especially the issue of energy efficiency, workforce and employment in Macedonia. The same research principle was applied in the analysis of individual pieces of legislation.
The selection was made based on the relevance of strategies and legislation in terms of the issues studied, that is, the creation of prerequisites for producing green skills. As to the time horizon, the analysis takes into account current strategies and documents, but also those developed in the last 15-20 years. Here, the intention of our country to be integrated in, and accede to, the EU should be taken into account, which, overall, is also reflected in the analyzed strategic documents and legal acts which were drafted in accordance with the EU standards.

Starting from the research goal set in this way, a dilemma arose regarding the ratio between the quantitative and qualitative approach. Given the primary focus of this analysis (strategies and legislation), it is quite logical that primacy is assigned to the qualitative approach. Thereby, as numerous studies indicate, this approach does not swerve from international research practice in this area. In fact, it is known that "the assessment of (green) skill needs can be either quantitative or qualitative. Green transition is accompanied by changes in the number of workers in various occupations (hence the need for a quantitative assessment), as well as changes in the skills required for a particular occupation without changing the number of jobs (hence the need for a qualitative assessment)." (ILO, 2015, p. 139). Numerous studies show that the qualitative approach is more present and implemented. This may be the result of various reasons such as qualitative changes in the skills required (for example, the greening of existing occupations), or simply because quantitative data is not available.

A series of studies under the title *Skills for green jobs* was taken as a benchmark in this analysis. These studies were carried out twice, in 2010 and 2018, by the International Labor Organization (ILO) and the European Centre for the Development of Vocational Training (Cedefop). They included 6 European Union Member States such as: Denmark, Germany, Estonia, Spain, France and the United Kingdom.[11]

Unfortunately, as the following analysis will show, the general impression is that the strategies, but also the laws related to the relevant issues (environmental protection, sustainable development, energy efficiency, etc.), *do not mention the green skills issue or they mention it quite vaguely and circumstantially*. This is also supported by the State Statistical Office's classification (see: Appendix 6), and the Ministry of Economy's activities (see: Appendix 7), which confirm this by reflecting the absence of adequate activities by some of the relevant state institutions.

In this context, one more point should be emphasized. Namely, starting from the fact that the process of decentralization brought about great responsibilities for municipalities in the area of environmental protection and local economic development, in this case the dilemma arises in terms of any possible analysis of the strategic documents adopted at the local level (in particular the Local Economic Development Strategies and Local Environmental Action Plans – LEAPs). Thus, "local governments play a significant role in the design and implementation of training provisions, thanks to their linkage with local economies and local labor markets. Moreover, local green skills development programs can be very extensive, so without coordination at the national level, they can cause regional inequalities and inefficiencies." (ILO, 2018, p. 141). It is a fact that some of the existing LED and LEAP Strategies owned by our municipalities are outdated and in need of updating. Nevertheless, given the limited space, the ambition for research is saturated at the national level and only national strategic documents are considered, while a review of the place and role of local government in terms of creating green skills will be made in the section on the vocational education and training system.

[11] European Centre for the Development of Vocational Training - Cedefop (2010), Skills for green jobs - European synthesis report, Luxembourg: Publications Office of the European Union, and Cedefop (2019), Skills for green jobs: 2018 update. European synthesis report. Luxembourg: Publications Office.

2.2.1. Strategic aspects

According to the ***National Strategy for Sustainable Development in the Republic of Macedonia (2009-2030)***, unemployment is a multi-dimensional issue. Due to the continuously high unemployment rate, profound changes are required that are expected to bring about increased employment. The Strategy insists that labor market reforms should be in line with the main principles set out in the EU Sustainable Development Strategy and the Lisbon Strategy for the EU perspective of the country towards its employment rate enhancement. These reforms should take place in parallel with educational system reforms in order to improve the quality of teaching staff and train the workforce towards meeting the market needs. (*National Strategy for Sustainable Development in the Republic of Macedonia*, p. 18)

To this end, under the National Strategy, there is a need for additional funds and other resources for both the primary and secondary education. It is underscored that the public spending on education was increased in the 2007 budget by 16.2%. However, this positive trend should continue in order to reach a level of education spending per capita similar to the EU countries. Still, it is very important to increase its cost-effectiveness to achieve better results. (*National Strategy for Sustainable Development in the Republic of Macedonia*, p. 19)

As for sustainable development itself, it is pointed out that the main prerequisite for ensuring relevant changes in society is to understand and embrace the sustainable development concept and principles. It is specified that in Macedonia there is a lack of sufficiently developed awareness, understanding and acceptance of sustainable development concept and principles, with certain exceptions. (*National Strategy for Sustainable Development in the Republic of Macedonia*, p. 19) After all, a comprehensive diagnosis regarding the sustainable development in the Republic of Macedonia can be established through these more important points:

- Insufficiently developed awareness and understanding of, and commitment to, sustainable development,
- Need for significant improvement and strategic guidance of the education sector, and
- Need for inclusive organizational development and institutional empowerment in all spheres of public life, including policy making, legal and regulatory framework drafting, strategic planning, administration, monitoring and implementation, etc. (*National Strategy...*, p. 20)

The National Strategy for Sustainable Development does not pay special attention to skills and vocational education and training in Macedonia. This is confirmed by the fact that one of the three guiding support principles incorporated in the strategy itself is the one relating to the highly educated workforce. Namely, "the short-term focus should be on the highly educated workforce in order to prevent further 'brain drain' and preferably attract abroad-living Macedonians who are highly qualified, well educated and possess a large potential. Furthermore, they should be the driving force encouraging development." (*National Strategy for Sustainable Development in the Republic of Macedonia*, p. 21).

As to the implementation of sustainable development in Macedonia, the insufficient understanding, awareness and commitment to the sustainable development concept and principles are also cited as some of the bigger obstacles in other strategic documents. This means that it is necessary to work on the implementation of this concept in society, and thus, in vocational education and training, in order to shape such education into specific green skills and qualifications. After all, the ***National Strategy for Environmental Approximation*** indicates that one of the main issues and uncertainties related to the required approximation of our society to the EU spirit and EU acquis communautaire is seen precisely in the *integration of environmental aspects into the other strategic areas*. (National Strategy for Environmental Approximation, p. 167).

In the ***2014-2020 Strategy on Environment and Climate Change*** (2015), it is noted that the sustainable development concept should become a development benchmark for the country, leading to the alignment of environmental goals with its long-term national, social and economic interests, in a wider context. In this sense, the Strategy supports the need to incorporate environmental and climate change issues into other sectoral policies. Also, it is taken into account that the EU integration does not mean only harmonization of the legislation, but also implementation of the EU standards and criteria set out by the national legislation as a complete process of environmental and climate change approximation. This should bring changes in the existing institutional setup and engagement of both human and financial resources sufficient to achieve the goals established. (2014-2020 Strategy on Environment and Climate Change, p. 5) After all, the Strategy is based on several general principles, where one of the most important ones is related precisely to sustainable development: "The Republic of Macedonia embraces the sustainable development concept as a way that leads to economic progress and social well-being such that it does not have any negative effects on the environment" (2014-2020 Strategy on Environment and Climate Change, p. 7).

The Strategy recognizes the need to change existing trends and practices that harm the environment. Based on the need for change and sustainability, this is ingrained in the following *principles*:

- Environmental and climate change goals can be achieved only if environmental protection integrates environmentally harmful areas;
- Environmental protection must be based on shared responsibility, since only by full cooperation of stakeholders can the agreed measures be achieved;
- Improving the environment implies the use of mechanisms and instruments for its protection, as well as encouragement of a voluntary approach based on awareness of the daily needs for active care of the environment. (2014-2020 Strategy on Environment and Climate Change, p. 7).

The ***Long-term Strategy on Climate Action - with an Action Plan*** (2021) appears as an addition to the previous strategy. This Long-term Strategy defines the contribution expected to be made by our country to the global efforts for implementation of a green, low-carbon and climate-resilient development, based on the best available information. All this should be in the context of the country's accession to the EU.

The long-term goal contained in the Strategy is quite ambitious. Namely, a 42% reduction in greenhouse gas emissions is predicted by 2050 compared to 1990 (with the exception of the Forestry and Other Land Use sectors, as well as MEMO, i.e. greenhouse gas emissions from aviation and electricity imports). To this end, "cumulative capital investments of 35 billion euros shall be required in the period 2020-2050. The total cost of the energy system is 121 billion euros for the same period... These investments shall create the highest number of green jobs in 2035: 10,000 green jobs, which is 2.7 times more jobs than the current number of employees in coal-fired power plants in the RN Macedonia." (Long-term Strategy on Climate Action with an Action Plan, p. 8).

It is interesting that in addition to its main long-term goal, the Strategy also contains 9 objectives. The last objective refers to: promoting the green transition through capacity building, training in new skills and awareness raising. In this sense, the Strategy pleads that the transition to a low-carbon economy should be based on technological innovation and relevant investment decisions; however, making relevant decisions is something that is expected from every citizen, too. Also, "reducing greenhouse gas emissions requires new *technical skills* that can be acquired by education through the school system, but also through adult training, which would facilitate the transfer of workers from sectors with job losses to sectors with job gains." (Long-term Strategy on Climate Action with an Action Plan, p. 27)

The Strategy pays due attention not only to the economic and environmental, but also to the social aspect. In this sense, as previously noted, the largest number, i.e., around 10,000 green jobs, should be created in 2035. In doing so, it is expected that "renovation contributes the most to the creation of new jobs (about 58%), followed by the construction of new houses, including passive houses (with a share of about 19%)... In addition, measures with the largest share include: renovation of existing residential buildings (50% in 2035); construction of passive buildings (18% in 2035); no-incentive renewable energy sources, solar thermal collectors, renovation of existing commercial buildings and solar roofs." (Long-term Strategy..., p. 79) Interestingly, in terms of gender equality, it is expected that more than 27% of new domestic green jobs in 2050 may be assigned to women.

The implementation of policies and measures related to climate activities contained in the Long-Term Strategy is expected to accelerate the recovery of investments and activities in some of the most important sectors of the Macedonian economy (services, tourism, construction and energy), but also the expectations are that in this way, new jobs will be created. In fact, "the implementation of the measures envisaged will also generate green jobs and create training opportunities in areas such as renewable energy, energy efficiency, energy access, improving household resilience, providing the infrastructure required to support an active transport and infrastructure, sustainable and resilient sectors, such as forestry and agriculture, etc." (Long-term Strategy..., p. 198). It is clear that in this sense, the Long-Term Strategy on Climate Action opens up space for the development of *green competences and skills*.

The Industrial Strategy of the Republic of Macedonia 2018-2027 with an Action Plan establishes the vision of: "advancement of industrialization by stimulating the growth and development of the manufacturing industry with the aim of enhancing productivity, creating new jobs, increasing revenues and empowering human capital, while resolving the circular economy challenges." (Industrial Strategy of the Republic of Macedonia 2018-2027, p. 50).

It is interesting that one of the 5 strategic goals refers to *Catalyzing green industry and green manufacturing*. This strategic goal is a significant step forward compared to the previous strategy or the *Industrial Policy (2009-2020)*. There, it is stated that "the greening of an enterprise or industry is not a one-time action, but a continuous process of gradual and radical changes that lead to improved performance. Conditions promoting the greening of industries cannot be achieved by a single policy instrument. The greening of industries means to ensure that all industries, regardless of their sector, size or location, shall continuously increase their environmental performance. This includes a commitment to reducing the environmental impacts of processes and products by a more efficient resource use, toxic substance-phasing out, fossil fuels replacement with renewable energy sources, occupational safety and health improvement, manufacturer's increased responsibility and overall risk mitigation." (Industrial Strategy..., p. 62).

A number of measures are foreseen for the realization of this goal, including: green regulatory reform; green public procurement for high-impact goods and services; embedding sustainability as a core business strategy for manufacturers; supporting green initiatives in the manufacturing industry (greened value chains); development of industrial green zones (IGZs) with a focus on the manufacturing industry; stimulating resource/energy efficiency and low carbon/resource efficiency by using best techniques available in the manufacturing industry; supporting small and medium-sized enterprises (SMEs) in remanufacturing processes; as well as supporting SMEs in additive manufacturing.

In addition to the above, it can be pointed out that one of the measures for the realization of Strategic Goal 5 - Building a learning manufacturing industry, includes Awareness raising and training in circular economy, green industry, closed cycle manufacturing, energy efficiency and clean manufacturing. It is underscored that "greening is no longer just an option, but an urgent necessity for manufacturing companies to remain competitive and gain an advantage over their competitors, especially if they want to export. It is a fact that Macedonian manufacturing

SMEs are still relatively uninformed about the potential threats, as well as the benefits offered by the concepts of circular economy, green industry/manufacturing, etc. The role of information provision, awareness raising, education, training and capacity building should not be underestimated..." (Industrial Strategy..., p. 73)

The Industrial Strategy pays due attention to human capital as an important factor on which the level of productivity and innovation in the Macedonian economy depends. It emphasizes that Macedonian companies cannot boast of adequate investments in managerial skills training (among other things, important for concluding contracts with foreign investors), and moreover, managers often lack "soft" skills (networking, speaking, negotiating). However, of greater interest in the context of this research is the finding that "the supply of skills in the economy is not adequate to the jobs offered, despite high educational achievements. Half of manufacturing companies report skills shortages in their current workforce... This is an indication of skill inadequacy for the modern economy needs... Among the companies that reported issues related to having difficulties to find workers, skills were identified as the biggest obstacle. Inadequate training and lack of experienced workers are more important issues than average wages or social security costs and employment regulations... There is a mismatch between the skills being taught and market needs. The vocational education and training system is characterized by narrowly defined vocational profiles, but the demand for skills is moving away from routine cognitive activities, towards new economic skills that include non-routine skills, such as, among other things, the ability to independently learn new things and the ability to communicate. (Industrial Strategy..., p. 37-38).

Obviously, the Strategy clearly notes the need to match the workforce skill-set with market needs. The possibilities of filling this gap, that is, improving the skills, are of course sought in the vocational education and training system. As a matter of fact, within the SWOT analysis of the manufacturing industry in our country, one of the most serious threats noted was "the mismatch between the educational system (i.e., the vocational education and training system) and the needs of the market" (Industrial Strategy..., p. 50). Unfortunately, in this context, *there is no talk of green skills at all.*

The National Small and Medium-Sized Enterprises Strategy (2018-2023) was drafted in line with the European Union's Small Business Act (SBA). In this regard, the Strategy seeks to create conditions for empowering small and medium-sized enterprises (SMEs) in Macedonia to turn environmental challenges into business opportunities, that is, the Strategy supports the development of "green SMEs" (*National Small and Medium-Sized Enterprises Strategy - 2018-2023*, p. 7).

The Strategy contains a number of *principles* that it incorporates into the basis for the development of SMEs in Macedonia. One of those principles refers to "empowering SMEs to turn environmental challenges into business opportunities" (*National Small and Medium-Sized Enterprises Strategy - 2018-2023*, p. 24). To this end, the Government is expected to provide more information, expertise and financial incentives to help the SME sector take advantage of the opportunities of new "green" markets and increased energy efficiency, in part through the implementation of environmental management systems in SMEs. Unfortunately, this again, is not about creating the prerequisites for green skills creation.

In fact, one of the three strategic goals of the National Small and Medium-Sized Enterprises Strategy (2018-2023) is the creation of - A dynamic entrepreneurship and innovation ecosystem, which implies - Encouraging the economic competitiveness of Macedonia by enhancing the entrepreneurial and innovative capacity of SMEs.

The SME Strategy had the ambition to create a dynamic entrepreneurship and innovation system that encourages and supports the establishment of new and innovative enterprises. It is assumed that this would strengthen the ties between industry, education and academia, as

Macedonian enterprises very rarely maintain close ties with educational and scientific institutions and research centers. Creating, strengthening and maintaining these links should encourage the internationalization of research activities and help promote partnerships with EU research institutes and enterprises.

The Government has recognized the importance of human capital development by preparing young people for entrepreneurial challenges. The National Entrepreneurial Learning Strategy and the initiatives of the National Entrepreneurial Education Network set out clear guidelines in this regard. The next phase of these efforts should integrate teacher and student training to ensure that such training is available at all levels of the education system. This should include establishing new partnerships between the Government, industry and education. It should also improve the infrastructure and institutional support services required to promote innovation through soft skills development and capacity building activities of SMEs and innovative startups, as well as support through networking, thus bringing together the academic community, the private sector and other stakeholders. However, here again, green skills are not explicitly mentioned.

The above mentioned ***Entrepreneurial Learning Strategy (2013-2020)***, as its main objective had the improved competitiveness of SMEs - especially those managed by young people and women, with the aim of empowering them to successfully compete in the EU markets. The Strategy sought to achieve this by improving the employability skills and entrepreneurial competences of young people and strengthening the entrepreneurial spirit through lifelong learning principles embedded in all segments of the education system.

One of the main missions of the Strategy was to improve the employability skills of young people in the country, which was supposed to lead to increased opportunities for their employment. In addition, the growth of productivity and competitiveness of Macedonian enterprises was to be supported. (*Entrepreneurial Learning Strategy 2013-2020,* p. 10). Unfortunately, there was no mention of green skills.

The Strategy for Energy Development in the Republic of North Macedonia until 2040 (2019) adopts the vision of: *a reliable, efficient, environmentally friendly and competitive energy system that is capable of supporting the sustainable economic growth of the country*. In order to achieve this vision by 2040, the Strategy adopts three scenarios: a reference scenario, a moderate transition scenario and a green scenario. In the development of the three scenarios, five priorities were incorporated: a) energy efficiency, b) energy markets' integration and security, c) decarbonization, d) research, innovation and competitiveness, and e) legal and regulatory aspects. In terms of creating an environment for green skills development, the first and fourth priorities are particularly significant.

Energy efficiency is presented as a very important priority related to which the Strategy envisages making great efforts to maximize energy savings until 2040. It is also noted that in the period until 2017, a downward trend in the consumption of primary energy was observed, while the consumption of final energy remained stable. To support this priority, the Strategy, among other things, recommends as follows:

- *Intensify energy efficiency policies and take appropriate measures* in the sectors of building, industry, public transport, heating and cooling, transformation, transmission, distribution of and response to energy demand, as well as horizontal measures. The application of such measures is expected to affect emission reduction, but even more to reduce dependence on imported energy and stimulate the domestic economy by local employment opportunities;

- *Formulate energy efficiency goals in terms of primary energy savings;*

- *Continuously reduce distribution grid losses* that would further reduce the primary energy consumption;

- *Enhance central heating systems' efficiency* by systematic distribution network reconstructions and efforts to restore disconnected users and increase the number of newly connected ones, etc.

The second important priority concerns *Research, Innovation and Competitiveness*. The Strategy tries to lay the foundations for minimization of the energy system's total costs based on optimization at lowest cost, while taking into account the country's specific conditions. To this end, the Strategy recommends a series of activities, including as follows:

- *Include energy transition technologies in national research and development priorities* and stimulate cooperation of scientific and research institutes and universities with policy makers, the economy, local government, associations, etc.;

- *Adapt energy-related curricula at all educational levels,* and stimulate geographical and intersectoral mobility of researchers;

- *Encourage new services and jobs, especially for small and medium-sized enterprises (SMEs)* in the area of renewable energy sources (RES) and energy efficiency (EE). It is underlined that there is a favorable business environment in our country, as a good prerequisite for supporting SMEs in their efforts for new investments, unemployment reduction and growth stimulation. However, additional provision of financial and technical assistance to SMEs in the energy sector is needed to facilitate these enterprises' access to external services.

Finally, an activity related to the priority of *Energy markets' integration and security* is worth mentioning. In particular, the Strategy aims at greater integration of North Macedonia in the EU energy markets, while not increasing its energy dependence and allowing the flexibility required for greater RES integration. Among the numerous activities serving the purpose of this priority, the *Development of socially responsible and just transition programs* stands out, and its goal is to eliminate the negative effects of job losses by employees' retraining and redeployment and by stimulating new jobs in low-carbon technologies and services. It is clear that in this regard, it shall be required to have an active labor market policy that would be supported by the educational system in terms of creating new, primarily green skills and qualifications.

Box 1: Carbon transition in Macedonian conditions: The case of Oslomej TPP

Numerous analyses speak about the importance of green skills, whether directly or indirectly. One such Macedonian case study is the one prepared by the Center for Economic Analyses (CEA) to meet the needs of the Eco-awareness Environmental Research and Information Center in 2019, entitled "Economic analysis - transition to lignite-free development: the case of Oslomej". This analysis is based on the current situation, where the future of coal in Macedonia is becoming less and less attractive, especially considering the low quality or low thermal power, limited reserves, changes in EU regulations and strengthening the EU environmental legislation, competition with renewable energy sources, etc.

The impact of such trends is also felt in the southwest region of Macedonia, where the Oslomej Thermal Power Plant is located and whose lifespan is almost at its end. On the other hand, TPP Oslomej has a significant effect on the local economy, especially as a facility that employs a significant workforce. Now, a need is arising to prepare it for its transition to a post-lignite era. The analysis assesses the cost-effectiveness under three scenarios based on several assumptions related to the local added value and jobs that would be lost as a result of the expected Oslomej closure. The alternative economic activities in which the existing Oslomej workforce would be involved, while considering the previous proposals explored by the stakeholders, are focused on economic activities that are not related to the extraction and burning of lignite, that is, the emphasis is placed on the primary agricultural production sector, the secondary manufacturing industry - food processing sector, and the tertiary tourism development sector.

The conclusions reached are very indicative: *"economically most favorable scenario is the closure and decommissioning of Oslomej as soon as possible, including an adequate plan for workforce substitution and reintegration, and economic activity generation in other sectors",* while in the case considered, a combination of primary agricultural production, processing industry and development of services in the area of tourism, is expected to generate benefits of 2.16 billion denars within a period of twenty-five years with an economic internal break-even rate of 24.4%. The economically most unfavorable scenario is to not take any activity or a decommissioning process, with no efforts to replace the labor force, since it would have comprehensive implications on society as a whole. (Eco-awareness, 2019, Economic analysis - transition to lignite-free development: the case of Oslomej, p. 8).

The ***Program for Implementation of the 2021-2025 Energy Development Strategy*** (2021), elaborates and analyzes in detail the Strategy priority of *Research, Innovation and Competitiveness*. In doing so, reference is made to the component of Raising the level of education regarding the sustainable energy need. The main goal in this direction is: adapt energy-related curricula at all educational levels to match energy transition trends. This implies taking measures to develop awareness of sustainable energy, starting from the lowest levels of education and including such measures in the curricula of all primary, secondary and tertiary levels of education. In addition, encouraging science and education in the energy transition should help mobilize existing and build new research capacities, as well as ensure better integration thereof into the European Research Area (ERA) regarding any energy topics. (*Program for Implementation of the 2021-2025 Energy Development Strategy*, p. 90).

Within the section on Strategy's Legal and Regulatory Aspects, the Program for Implementation of the 2021-2025 Energy Development Strategy, in a separate box, speaks about a Just Transition Program. The main goal is: develop programs for a socially responsible and just transition. This implies that depending on the level selected for transition from conventional energy, it is very important to develop socially responsible and just transition programs to mitigate the negative effects of any associated job losses in the regions affected. These programs are expected to answer the question of how to redeploy employees to other jobs and stimulate new job opportunities in different economy segments in the affected region. This should happen primarily through investment in low-carbon technologies and services, with broad bottom-up consultation taking place. (*Program for Implementation of the 2021-2025 Energy Development Strategy*, p. 95)

Again in the section on Strategy's Legal and Regulatory Aspects, the Program for Implementation of the 2021-2025 Energy Development Strategy talks about Simplifying the procedures for investments in renewable energy sources (RES). The main goal is to facilitate the decision to invest in the construction of RES production facilities and speed up the investment process. This means that sometimes the investor's decision is strongly influenced by the level of administrative burden faced by the investor. So, investing in the construction of RES generation facilities in our country is burdensome and time-consuming (including many administrative procedures to be completed and different institutions to deal with). During the last few years, certain procedures have been simplified and thus, the average investment period has been reduced from 36 to 24 months. However, further simplification of procedures and harmonization of their implementation in different institutions is required. For this to happen, changes shall be made to the legislation relating to land planning, conversion and management. (*Program for Implementation of the 2021-2025 Energy Development Strategy*, p. 100)

The main goal of the ***Strategy for Improvement of Energy Efficiency in the Republic of Macedonia until 2020*** (2010) was to develop a framework for the accelerated adoption of energy efficiency practices in a sustainable manner through the implementation of a series of programs and initiatives related to import-dependence reduction, energy intensity reduction, non-productive electricity use, development of a good climate to maximize the involvement of and opportunities for the private sector through complementary advocacy and training activities. In fact, by using the elements included in the Strategy, a progressive market transformation was to be stimulated, which means stimulating demand for technologies and services with greater energy efficiency. The growth of such demand should have encouraged the establishment of energy service companies (ESCOs) and companies that provide equipment with greater energy efficiency and adequate maintenance thereof.

This "market conditioning" required training and capacity building at all levels. All actors, from bureaucrats and legislators, to municipalities and industrial managers, bankers and NGOs, had to acquire a range of new concepts and skills. There is an expectation in the Strategy that public awareness campaigns should support the awareness change required to start undertaking gradual but crucial processes for market transformation.

It is envisaged to organize training under the set of legal measures in order to ensure the realization of Strategy's goals in the industry sector. Namely, by using an efficient training program, it was planned to obtain a relevant number of trainers or experts, who would then train the industry staff to perform assessments, develop and finance energy efficiency projects, and who would take part in pilot project implementation. Although this is about acquiring some kind of green skills, it should be taken into account that such training is aimed at a pool of people who have completed higher education.

It is interesting that the Strategy contained a special set of education and training measures. In that context, the following were foreseen:

- Build the capacities of education, i.e., introduce in the education sector new curricula related to energy efficiency measures, including all vertical levels (primary education, secondary education, universities);

- Education and awareness-building at all levels, where public awareness and educational initiatives as the best method for rapid energy savings should address all consumer groups and be launched at national, regional and local levels. This includes a wide range of awareness-raising initiatives covering a wide range of issues, starting from making informed decisions when purchasing household appliances to making decisions on issues related to energy efficiency planning at both national and municipal levels; and

- Professional training or certification of Energy Auditors. Training and accreditation of Energy Auditors can help ensure proper identification of energy efficiency improvements and recommendations for construction and industrial facilities, and uniformity of such recommendations across the country. (*Strategy for Improvement of Energy Efficiency in the Republic of Macedonia until 2020*, p. 10).

2.2.2. Legal aspects

To make new legislation or amend existing laws can be much more difficult than to apply the current legal framework. However, the allocation of the state budget and funds or the creation of new jobs in the public sector at a time when the state/government is facing fiscal constraints is a relatively difficult task. Therefore, priority should be given to the creation of a framework that would enable better implementation of laws in practice.

The Law on Environment (2005) contains the main environmental protection principles which are the basis for the definition of environmental management procedures. These principles are the common basis for all laws regulating individual environmental media.

The main goals of the Law are envisaged to be implemented by a series of measures, of which, for our purpose, the following are particularly interesting (Article 4):

- Develop awareness of the need for environmental protection in the educational process and promote environmental protection; and

- Align economic and other interests with the requirements for environmental protection and improvement.

Among the number of principles incorporated in the Law, two are particularly important:

- The principle of integration - foresees that the bases and objectives of the environmental protection and improvement policy shall be integrated in all development, strategic, planning and program documents adopted by the state government bodies and the bodies of municipalities, the City of Skopje and its municipalities; and

- The principle of sustainable development according to which, in order to meet the needs for a healthy environment, as well as the social and economic needs of current generations, without jeopardizing the rights of future generations to meet their own needs, when any activity is undertaken or performed, care shall be taken of rational and sustainable natural resource use.

However, the Law does not mention green skills in any context at all, although there is a separate area that discusses Education in the field of environmental protection and sustainable development (Article 48). In this context, the Minister of Education and Science is required to "approve primary or secondary education curricula where environmental protection is foreseen as either an elective or mandatory subject", while "the municipality, the City of Skopje and the municipalities in the City of Skopje in their areas, shall encourage the development of education and public awareness in the area of environment."

The legal framework on waste management was established by the ***Law on Waste Management*** (2011). The Law regulates issues in terms of waste policy framework in the broader sense of the word. It includes the main principles of waste management (the principle of environmental protection in waste management, waste minimization, precautionary principle, proximity, universality of services, polluter pays principle, return system, etc.). Again, waste management as a public service is based on the principle of universality of services, which includes sustainability (in Article 3, sustainable development is noted as one of the goals of the Law). However, green skills and qualifications are not mentioned in any context.

The Law on Nature Protection (2004) contains provisions that help transpose the EU principles on nature protection. In fact, the protection of nature under the Law shall be performed through both the protection of biological and landscape diversity and the protection of natural heritage within and outside protected areas. Protection shall be achieved by taking appropriate measures and activities, and certainly, by natural resources' sustainable use, and spatial planning and development. Hence, the sustainable development principle incorporation (Article 7) is noticeable, but again, the text does not mention any green skills and qualifications.

Macedonia has already signed and ratified the Energy Charter Treaty, the Energy Community Treaty, and the United Nations Framework Convention on Climate Change. Under the Energy Community Treaty, our country has aligned its legislation on energy, environment and competition, renewable energy sources, energy efficiency and oil reserves, with the European Union applicable legal regulations (acquis communautaire). Macedonia's strategic decisions regarding the energy sector, including the decision to comply with the acquis communautaire, have been applied in the context of the Energy Law. In order to make some of the provisions of the Energy Law operational, a number of by-laws were adopted. Also, many laws and by-laws were adopted in the field of environmental protection, energy efficiency and other important areas.[12] What should follow is the rounding off of the energy sector legislation, and in certain cases, improvement thereof. In this context, room for the creation of *green skills* is very important, because "the development of such skills contributes to the implementation of the energy sector regulations, given that adherence to these regulations requires specialized skills and knowledge, as well as enhanced environmental sustainability awareness." (ILO, 2018, p. 135).

Many important impulses to create green skills can be found in the ***Energy Law*** (May, 2018). This Law is an improvement of the 2011 Law which previously ensured compliance with the EU accession partnership priorities. By its adoption, greater emphasis was placed on the energy efficiency issue, while further encouraging the use of renewable energy sources, as well as environmental protection and negative climate change impact mitigation when performing energy activities. Certainly, this Law enables additional energy market liberalization and strengthens the role of the Regulatory Commission.

The Energy Law stipulates that one of the main goals of the energy policy shall be energy efficiency, as well as the reduction of fossil fuel use while encouraging greater use of renewable energy sources. Although a separate chapter is not dedicated to energy efficiency as in the

[12] Some of the most relevant by-laws in the area of energy efficiency (EE) are the following: Decree on indicative targets for energy saving (2011), Ordinance for eco design of products (2011), Rulebook on high-efficient combined utilities (2011), Rulebook on labeling energy use and products that use energy (2011), Rulebook on Energy Performance of Buildings, Rulebook on Energy Control, etc. (According to: Kirov Andon, 2012, National legislation in the area of energy efficiency in the Republic of Macedonia, Conference presentation: "Encouraging Energy Efficiency in the Republic of Macedonia", Ministry of Economy, 12 September 2012, Skopje, p. 3-4).

previous Energy Law of 2011, this Law implicitly refers to the implementation of efficient energy use measures and activities, provision of energy efficiency and energy control services, including requirements for the public sector to devote special attention to energy saving.

The Law stipulates that the foundations for implementing a consistent energy policy are laid down in the Energy Development Strategy, which, among other things, shall contain incentive measures to encourage energy efficiency, renewable energy sources use and environmental protection measures.

From an institutional viewpoint, the place and role of the Energy Regulatory Commission in terms of monitoring the energy market situation and operation was confirmed. In fact, the detection of irregularities and competition distortions, as well as the detection of various forms of unfair competition, are very serious issues that fall within the jurisdiction of the Regulatory Commission.

Considering the limited energy reserves available to Macedonia, it is clear why, in the face of an intensified energy crisis, we are becoming more and more concerned about our dependence on energy imports. In this context, good management of limited energy resources and the necessary energy efficiency can contribute towards a partial mitigation of such dependence in the short term; however, this does not mean that the need for significant investments in energy infrastructure in the medium and long term could be avoided.

The current energy and economic crisis caused by the worldwide Covid-19 pandemic and the war in Ukraine has strong social implications in Macedonian society. For the largest number of citizens and companies in the Republic of North Macedonia, saving energy arises as one of the priorities in their everyday life. Hence, paying attention to *energy efficiency* (EE) is extremely important. Of course, the application of energy efficiency technologies cannot happen overnight, but it is a priority task for both policy makers and the business sector and households. It is a realistic assumption that such transition could be expected in the medium to long term.

Energy efficiency has a wide scope, but in the most important sectors, it is characterized by a high labor intensity level or it imposes the need to create new jobs per se, and thus the need for new qualifications and skills. Given that in our country we cannot be proud of paying adequate attention to energy efficiency so far, great opportunities for the creation of new jobs are clearly hinted. This is emphasized further by the need for state support for socially disadvantaged and low-income families. Without such support, the necessary energy efficiency progress and improved energy consumption will not be economically justified at the macro level.

In the context of the above, some of the more important goals of the 2020 ***Energy Efficiency Law*** can be noted, such as (Article 2):

- Achieve the energy sector sustainable development goals,
- Increase energy efficiency in the area of housing and construction by improving the energy performance of buildings; and
- Create conditions for energy service provision, and develop the market through the availability of energy efficiency-enhancing services and products.

The initial view of the goals specified points to the conclusion that the Law can be expected to create legal prerequisites for a possible creation of green skills and qualifications in the educational system. Namely, the Law refers to the compliance with sustainable development principles. By referring to the need for enhanced energy efficiency in housing and construction, room is opened for creating a demand for new green skills of the workforce that would be involved in these activities. And of course, the Law implies the creation of space for developing

the market of products and services that would increase energy efficiency. This is confirmed by Article 4, where one of the goals of the energy efficiency policy, whose creator is the Government and the relevant ministry, among other things, is the development of the energy services market.

In addition to the Government, Local Government Councils also receive relevant tasks in this area. Namely, "The Council of the Municipality or the City of Skopje shall, at the proposal of the Mayor, and after previously receiving a positive opinion from the Agency, every three years, adopt an Energy Efficiency Program." (Article 7)

In general, the Law does not explicitly mention green skills, with the exception of the education and qualifications of Energy Auditors, who are required to have a university degree (completed higher education in the field of construction, architecture, mechanical engineering or electrical engineering, i.e., a minimum of 180 credits according to the European Credit Transfer and Accumulation System (ECTS).

The main activities envisaged to be carried out in industrial green zones under the 2013 ***Law on Industrial and Green Zones*** (Article 7) include light and non-polluting industries incorporating any type of manufacturing that does not require a lot of energy; does not create a large turnover of raw materials, materials and traffic; and does not produce harmful emissions, such as the following:

- Organic food processing,
- Renewable sources power generation, and
- Recycling-based production.

Despite the precise listing of the green business activities foreseen to be carried out within these zones, no attention at all was paid to the skills and qualifications of the employees of companies that would operate within such zones.

Article 56 of the ***Handicraft Law*** (2015) talks about the activities of the Handicraft Chamber as a professional and business organization of craftsmen. Some of its more significant activities refer to making proposals to organize forms of vocational education for its members and taking care of retraining and upskilling of craftsmen and other persons. The Law does not contain any provisions on green skills and qualifications.

2.3. Macedonian labor market – conditions and trends

Since its independence up until today, our country's labor market has been very unstable. Knowing that in the initial 15 years, Macedonian society was burdened with transition process-related activities, followed by some issues related to the world economic crisis (2007/2008), it becomes clear why labor supply was continuously higher than the demand.

Given the foregoing, it is no surprise that the unemployment rate was high throughout the period. However, it is not a result only of the transition process. Namely, the Macedonian labor market entered the transition process with high unemployment rates as a legacy of the 1980s economic problems (before the start of the transition process). More precisely, Macedonia entered the process of independence and transition with a high unemployment rate of 22.6%. As it was emphasized, this high unemployment rate was further increased as a consequence of the economic and social system transition during the 1990s and in 2005, it was 37.3%. Since then, it has experienced a downward trend to reach a level of 17.5% in 2019. According to the latest State Statistical Office data, in the first quarter of 2022, the active population in the Republic of North Macedonia is 811,197 people, of whom 691,498 are employed, and 119,699 are unemployed. According to these data, the activity rate in this period is 55.3%, the employment rate is 47.1%, while the unemployment rate is 14.8% (Table 3).

Table 3: Population aged 15 and over, by economic activity and gender

	Quarter I, 2021	Quarter I, 2022[1)]		I / 2022 ---------- I / 2021
	Persons	Persons	Structure by gender	
Active population				
Total	943 964	811 197	**100.0**	**85.9**
Men	565 140	486 167	59.9	86.0
Women	378 824	325 030	40.1	85.8
Employed				
Total	793 121	691 498	**100.0**	**87.2**
Men	469 863	410 509	59.4	87.4
Women	323 258	280 989	40.6	86.9
Unemployed				
Total	150 843	119 699	**100.0**	**79.4**
Men	95 278	75 658	63.2	79.4
Women	55 565	44 041	36.8	79.3
Inactive population				
Total	741 600	656 152	**100.0**	**88.5**
Men	278 462	239 785	36.5	86.1
Women	463 138	416 367	63.5	89.9

Source: State Statistical Office, 2022.

[1)] In processing the data for the first quarter of 2022, the regional demographic distributions by gender and by five-year age group were used to calibrate the population in line with the 2021 Census data.

The labor market performance and labor force structure are important aspects in the analysis of possibilities for the emergence of new qualifications and skills in any economy. In particular, if the labor market is characterized by rigidity, and the labor force has a relatively undiversified structure, then the signals for the emergence of new qualifications and skills, if any, will lose some of their relevance. Unfortunately, the conditions of the Macedonian labor market are exactly like this: for most of the period after independence, this market proved to be inflexible, which was followed by the unfavorable structure of the labor force, especially in terms of the level of education, age and employment waiting time. Certainly, caution is needed when drawing conclusions because, for example, among young people, the lowest unemployment rate is found among those with a primary education or lower (30.9%), and the highest rate is found among those with a university degree (40%).

As for the chronic unemployment, it is also a significant issue. Long-term unemployment (for over 12 months) affects adult workers aged 25-64 (77%) more than young people, among whom it accounts for 64.3% (*National Employment Strategy 2021-2027*, p. 35). Finally, the unemployment structure in terms of age is also unfavorable. Namely, the highest unemployment rate of 35.8% in 2019 was found among people under the age of 24. In this picture, there is a positive trend of unemployment decreasing as the age increases.

The education level of the working-age population (15-64 years of age) increased during the last decade, but is still below the EU average, especially in terms of share of people with tertiary education, or 18.3% in Macedonia, compared to 27.9% in the EU countries. (*National Employment Strategy 2021-2027*)

The health crisis in the last 2-3 years has worsened the labor market conditions, especially regarding the most vulnerable strata (individuals with lower education, the elderly and women).[13] Therefore, in order to predict any future movements, different scenarios are being developed, starting either from pessimistic or optimistic positions. It seems that all scenarios are more or less compliant with the relatively stagnant population activity rate in the Republic of North Macedonia that can be expected in the coming decade. This is due to several factors: a) a natural population decrease, b) increased emigration from our country during the last decade, and c) the significant number of long-term unemployed people who are close to retirement age and are expected to leave the workforce in the next 5-10 years. (*Strategy for Regional Development of the Republic of North Macedonia, 2021-2031*, p. 47).

Overcoming unfavorable labor force structures in the short to medium term cannot happen as an autonomous process. Therefore, appropriate policies and measures are required to be taken by the *state*. In this context, it is necessary to put into operation a number of instruments aimed at improving the workforce structure, particularly in view of education. First of all, this refers to the active labor market policies, which require a respectable amount from the state budget.[14] Certainly, these also include instruments and measures to encourage the acquisition of new green qualifications and green skills.

In addition to the state (or the Government), the labor market performance is also influenced by the other two types of institutions commonly found in this market: trade unions and employers' organizations. Very often, trade unions and employers' associations represent opposing views and have different influence. Under such circumstances, in the presence of the state as a mediator, the labor market adapts to changes, sometimes with greater, other times with less success. Namely, some of the activities of the institutions mentioned lead to an enhanced labor market flexibility, while others have influence in the opposite direction.

[13] According to the Employment Service Agency, as a result of the pandemic outbreak, in the first half of 2020, the number of unemployed people in Macedonia increased by 20,000.

[14] Just like in many other areas, also in this case, the examples and policies undertaken by the EU Member States are of reference. For example, in 2006, Germany committed 3% of its GDP to such policies. In this sense, training costs accounted for 41.1% of the total expenditure on active policies in the EU Member States, followed by the promotion of private employment initiatives at 24.2%.

Departing from this realization, any coherent analysis of the Macedonian labor market should take into account: a) trade unions and collective bargaining agreements, b) legislation governing labor relations, c) active labor market policies, and d) passive labor market policies.

The existence of trade unions and trade union organization in our country does not start in the period after independence. In fact, real trade union organizing appears several decades earlier. The serious labor force organization in trade unions is corroborated by the high rates of workers' coverage in a large number of sectors (the rate of union organization very often exceeded 90%). Unfortunately, during the process of transition and privatization of the former state-owned companies, in addition to the dismissal of a significant part of the workforce, there was a temporary stagnation in the workforce coverage by trade union organizations. Nevertheless, opposite trends have been emerging in the last decade.

Representative trade union organizations and employers (or the representative association of employers) take part in collective bargaining processes. Macedonian legislation on labor relations prescribes three types of collective bargaining agreements, including: *general collective bargaining agreement* at the national level, *special collective bargaining agreement* regarding a separate sector or branch, and *individual collective bargaining agreement* at the company level or with an individual employer.[15]

The *Law on Labor Relations* (2005) prescribes relatively restrictive rules of union organization. This is confirmed by the requirement that the collective agreements shall be valid during a 2-year time period with the possibility of extension thereof, but under the assumption that during that period there would be a freeze on employees' wages and reduced labor market flexibility. In spite of this, the labor market can be assessed as relatively flexible in this area. Namely, it should be underlined that the scope of collective bargaining agreements is still not very wide, while more than 60 percent of employees are found in the private sector, where as a result of the pressure of employers' associations, entry into collective bargaining agreements is more difficult.

Legislation in the field of employment protection has a significant impact on the Macedonian labor market operation's final outcomes. A significant segment of the transition process was the promotion of legislation that would reflect the new reality. In fact, by these reforms, companies and employers should have been put in a position to be able to withdraw from employment contracts in cases where there were justified economic reasons for doing so. In addition, this legislation strives to protect employees from unjustified employment termination and provide them with fair conditions to find another job or receive a severance pay.

As this legislation involves both employers and employees, it has a direct impact on labor costs, employment and even labor productivity. Consequently, economic reasoning refers us to the fact that higher and longer-term unemployment can be expected in conditions of a less flexible labor market supplemented by the lack of performance of relevant institutions. In fact, employment protection laws, which are characterized by a higher level of restrictiveness, have an impact in the direction of increased labor market segmentation, thus deepening the gap between the employed and the unemployed ("insiders and outsiders" effect).

On the other hand, empirical evidence confirms that stricter employment protection laws bring with them some conduciveness for the national economy and society as a whole. Namely, they increase the incentive for employers to invest in human capital and encourage cooperative working relations, which should lead to improved productivity and competitive and overall high

[15] Until 2010, there were two types of general collective bargaining agreements at the national level, such as: a general collective bargaining agreement for the economy and a general collective bargaining agreement for the public sector. Apart from these two, a large number of sectoral agreements and agreements at the company level have been concluded in our country. However, by 2019, collective bargaining was not widespread at the sectoral and company/enterprise level, partly due to the low level of trade union density (22%) and membership of employers' organizations (22%).

social stability.[16] Ultimately, this is reflected in the respective division of costs for harmonization between the state and the business sector.

Active policies have a major impact on the labor market. Macedonia is not an exception in this sense. The active approach of the Macedonian Government was particularly emphasized at the beginning of the transition period, more specifically at the end of 1993 and early 1994, when in cooperation with the European Bank for Reconstruction and Development (EBRD), the Government started implementing the social reform and technical assistance project.

In principle, active labor market policies and measures in Macedonia contain the standard measures and activities (adult vocational training, job subsidies, public works, professional rehabilitation and inclusion of persons with disabilities, as well as grants for startups). However, their scope has to be expanded.[17] This is an additional challenge for the Government, which should direct some of them to the development of certain green skills adequate to green jobs.

Passive policies also have a significant impact on labor market conditions. However, most of these policies are positively correlated with the unemployment rate. Namely, the possibility of using health insurance in case of unemployment and receiving compensation on various grounds, reduces the motivation of unemployed persons to search for formal employment. The reduction of health insurance, but also the scope reduction of the program for compensation in case of unemployment, would have an impact in the direction of reducing the unemployment rate in Macedonia.

The foregoing analysis suggests that our labor market can be characterized as inflexible. The relatively high rate of participation in the informal economy also speaks in support of this argument. Namely, a series of calculations by both domestic and international organizations (the International Labor Organization) talk about the engagement of almost one third of Macedonia's workforce in the sphere of informal economy (meaning also seasonal work, temporary employment and overtime work). It seems that this is understandable if it is known that according to some estimates, the informal economy in Macedonia accounts for around 20-25% of GDP.[18]

Informal employment in Macedonia decreased from 24.3% in 2011 to 15.2% in 2019. Data for the first half of 2020 indicates a further decrease to the level of 13.5%. Such decrease was particularly pronounced among young workers, for whom the informality rate fell from 45.9% of total youth unemployment in 2011 to 24% in 2019. Informal employment is more widespread among men (17% of total employment for men compared to 12% for women), then among young people, workers over 65 (probably due to the need to supplement their pension income), then among low-skilled persons and workers engaged in agriculture and the construction sector. In agriculture, the rate of informal jobs was estimated at 55% of total employment in 2019, while informality in construction has been stable at 36% throughout the period. (*National Employment Strategy 2021-2027*, p. 29-30).

As to the expectations for labor force dynamics, it can be said that there has been a gradual shortage of workers in traditional business activities, such as concrete workers, rebar workers, bricklayers, upholsterers, plumbers, electricians, roofers, window frame installers,

[16] The Labor Relations Law is very important in terms of any possible development of green jobs that can subsequently stimulate the creation of green skills. Under the Law, any employee shall have the right to continuous education, professional development and training in line with the operational process needs. The purpose of all this is to improve on-the-job work abilities and preserve the same. In fact, an employer shall provide continuous education, professional development and training for its employees, if the work process so requires. Also, the employer shall do the same if such education, development and training could prevent employment contract termination for any personal or business reasons. The duration, including the rights and obligations of the contracting parties before and after the completion of such trainings, shall, in principle, be regulated by a separate agreement or a collective agreement.

[17] Macedonia spends little on active labor market policies, and this results in a small coverage of unemployed persons. Thus, in 2019, only 0.17% of GDP was spent on these policies, and the active measures covered about 6.2% of the total number of registered unemployed persons. In contrast, Macedonia spends more on passive measures (primarily for social assistance).

[18] According to IMF estimates, the informal economy extent was estimated at around 38% of GDP in 2016 (IMF: Country report 20/24, IMF, Washington D.C. 2020)

thermal insulation installers, water protection installers, window shutter installers, etc. In the last 4-5 years, a significant contingent of this workforce has retired. In order to overcome this situation, it is necessary to train an additional 20 percent of new workers, preferably young people, who are supposed to come from the socially vulnerable population strata. However, due to the steady penetration of low-energy solutions in traditional construction, it is assumed that almost all workers would be engaged (albeit at different levels) in continuous vocational training dedicated to the main energy efficiency principles, regardless of whether the training takes place on the job or as a specialized training program.

The skills profile of Macedonian emigrants shows that low-skilled people are emigrating to European countries (such as Switzerland and Germany). Analyses of these cases indicate significant differences in the level of wages between Macedonia and the EU countries, which gives rise to the impression that higher wages are the main motive to emigrate to these countries. As for the highly skilled, they are more likely to migrate to overseas countries because they can afford the higher costs associated with this type of migration. (*National Employment Strategy 2021-2027*)

On the other hand, the supply of specialists for the installation and maintenance of the main renewable energy systems in buildings, as well as the workforce qualification level, are relatively limited. There is a clear shortage of installers for each of these systems (small boilers running on biodegradable substances, photovoltaic and solar thermal systems, geothermal systems and heat pumps, as well as small wind turbines). It follows that new specialized training schemes need to be developed and introduced. The pace of their introduction should progress at a rate that is similar or even higher than the expected rate of introduction of the systems mentioned.

All of this raises a number of challenges to the system of secondary vocational education, which, for many years, has been presented as different compared to the traditions and customs visible in most of the EU Member States. After all, our four-year secondary education system suffers from a low completion rate (47.2 percent), with the lowest enrollment rates among students from disadvantaged socioeconomic backgrounds and rural areas. (*National Employment Strategy 2021-2027*, p. 19). In this sense, one of the directions of its reformation should be to encourage the greatest possible presence of practical training in this phase of education, through increased cooperation with manufacturers and suppliers of materials and technologies, but also through the inclusion of the companies themselves within the training programs using dual education schemes.

In economic theory, there is a consensus that steady growth and creation of new jobs depends on macroeconomic stability. Therefore, economic policy makers are faced with the task of providing a prudent policy framework that would help reduce medium-term fiscal and external imbalances and ensure sustainability. Structural issues that have been burdening the Macedonian labor market for a longer period impose the necessity of higher economic growth rates in order to secure new jobs, including green jobs. In this context, an additional prerequisite is rising with regard to a possible employment growth. It is about advancing and upgrading the skills of existing employees, but even more so of the unemployed and the generations currently in the process of secondary vocational education (contingents of young people who should appear on the labor market supply side in due course). Naturally, when new skills of young generations are discussed, green skills take a significant place.

A large number of analyses show that the lack of modern skills not only among the engaged workforce, but also among the unengaged and potential workforce, is a very influential factor contributing to the modest labor market performance in our country. Taking targeted and incentivizing activities by respective policymakers in the direction of skills improvement and advancement would provide a significant contribution towards increasing the workforce productivity and quality, and it would certainly help to further reduce unemployment. In this sense, the advancements in both legal and institutional terms are very important.

Taking into account all of the above, Macedonia is faced with the need to pay as much attention as possible to (further) education of its workforce, but also its population as a whole. Only in this way can an increase in the level of competitiveness be ensured. The reforms so far in the education sector in the direction of introducing nine-year primary education, compulsory secondary education and revising the curricula to encourage the interactive way of teaching and learning, then starting to study the English language from a young age, while developing skills in the field of information technologies, can be evaluated as a positive step. But they should be complemented by providing conditions for the acquisition of additional green skills by young generations. The required increase in the budget allocated to the education sector can be mentioned for this purpose, in line with the criteria defined by the Organization for Economic Cooperation and Development - OECD (that is, a targeted amount of 5 percent of GDP).[19] Thus, the institutional capacity for fostering green skills, which among other things, are accepted on the labor market at the EU level, would be strengthened, giving way to increasing further the workforce competitiveness.

In support of the above is the fact that the inflows of foreign direct investments (FDIs) to Macedonia in the period from 2007 to the beginning of the health crisis and Covid-19 pandemic, amounted to about three percent of GDP. Most of them were "greenfield" investments. Obviously, they contributed to the increase in employment, and particularly to the increase in the demand for medium-skilled workers. A large part consists of young workers coming from secondary vocational education. However, a shortcoming has surfaced here: a lack of skills among this type of workforce. A number of foreign investors solved this deficiency through on-the-job training, supported and financed by the Government.

The National Employment Strategy 2021-2027 defines several goals that should contribute to the creation of new jobs and increased employment. Each of these goals contains a number of targets. The main goals and some of the more important targets are the following:

- *Improve the quality of educational outcomes at all levels*. This goal encompasses three specific targets, where the more important ones include the reduction of 5 percentage points in the vertical mismatch of skills with labor market requirements, and the increase of up to 30% in the share of adults (aged 25-64) in education and training[20];

- *Strengthen the role of economy and enterprise development policies in the creation of decent jobs*. A more significant target for this goal is the reduction of youth unemployment (15-24 years of age) to 27%, that is, to 23% for the group of 15-29 years of age; and

- *Strengthen the inclusiveness of labor market policies*. The achievement of this goal should be evaluated in terms of reducing the employment gender gap to 15 percentage points, then, reducing the long-term unemployment by 10 percentage points, and finally, reducing the share of persons at risk of poverty and social exclusion to 18%.

Considering these targets, and also the specific needs and conditions on the labor market in Macedonia, including the institutional capacities and budgetary possibilities to fund activities that reduce unemployment, among the more important measures (in addition to the standard ones such as support for self-employment and starting one's own business), measures by which the unemployed and young people would be enabled to acquire new knowledge and skills can be mentioned here. In fact, analyses show that students who complete secondary vocational education often continue with higher education, which is due to the limited offer of technical education at the post-secondary level and the low status of secondary vocational education

[19] Poor achievement of students in our country is partly due to the reduction of public investments in education, whose share in GDP fell from 4.5% in 2010 to 3.8% in 2018. Thus, education finance decreased from 4.6% of GDP in 2011 to 3.7% in 2018, indicating a low priority placed on education in national policies. (National Employment Strategy 2021-2027, pp. 19 and 48).

[20] In 2019, the vertical mismatch of skills with the labor market needs affected 30% of the working population (that is, the population aged 15-64). The high percentage of vertical mismatch was primarily due to the situation with people who completed a four-year secondary education and worked in elementary occupations, but also people with tertiary education working as salespersons or office workers.

qualifications (National Employment Strategy 2021-2027, p. 48). This is another confirmation of the previously emphasized need for providing opportunities of new skills (including green skills) acquisition for the unemployed. In this regard, the following can be highlighted as particularly important:

- Prepare for employment through *training, retraining or upskilling* of unemployed persons in order to acquire knowledge and *skills* that would increase their chances of employment, then
- Organize training for deficient labor market professions in accordance with the needs of the labor market itself, and
- Organize *training* to support young people (up to 27 years of age), for their first employment.

The 2018-25 Education Strategy sets out the most important actions required in the coming period if teaching is to be improved. Also, priorities are set in terms of developing student-centered teaching. In addition, it is now necessary to accurately measure the results achieved by students in the learning process, then to introduce national level assessment, improve the performance of teachers and enable a higher inclusion of disadvantaged children. A very important goal set by the Strategy is the reformation of the curricula for vocational education and training, in order to set the learning process on a basis that will be compatible with the conditions and requirements on the labor market. As a shortcoming, it can be stated that the Strategy does not establish a monitoring and evaluation system to monitor policy implementation.

In this context, the place and role of the Employment Service Agency of the Republic of Macedonia (ESA), as an institution engaged in the implementation and monitoring of employment policies, is inevitable. In fact, it is most responsible to assess the labor market policy performance and, in that regard, it undertakes activities to strengthen its administrative and institutional capacities. It seems that one of the most important tasks facing this agency concerns the need to undertake activities that are expected to contribute to harmonizing its services with the standard ones of the EU Member States as follows:

- Implement active employment programs and measures and develop employment services in order to expand their coverage of beneficiaries, which would strengthen the individual approach in relation to unemployed persons, especially persons with fewer opportunities and abilities for independent performance on the labor market,
- Continuously analyze the needs for skills emerging on the labor market in Macedonia.

To reduce the mismatch of skills with labor market requirements and the lack of skills, the Ministry of Education and Science established a Skills Observatory, in partnership with the Ministry of Labor and Social Policy (MLSP) and the Employment Service Agency (ESA). "The Observatory collects, analyzes and disseminates information on higher education offers, curricula and skills development, education and training costs, job placement for graduates, and labor demand forecasting. Currently, the Observatory is limited by not having access to university data. In addition, it is unclear to what extent the information produced by the Observatory is used for policy making." (*National Employment Strategy 2021-2027*, p. 49) As stipulated by the Law amending and supplementing the Law on Secondary Education (2020), one of the most important tasks of the Observatory is to facilitate the process of matching the labor force demand and training programs at the local and national levels.

Finally, the National Employment Strategy 2021-2027 refers to numerous analyses, according to which, in the last few years, slow progress has been observed in matching the knowledge and skills acquired with the labor market needs. Moreover, the skills mismatch is

deepening and graduates' initial employment rate remains very low (even the lowest in Europe). In such conditions, it is not surprising that companies are forced to provide additional skills to the workers they hire shortly after their graduation.

As for the next period, the National Employment Strategy 2021-2027 notes a challenge that is particularly important when considering the creation of green skills among young generations. It is about the fact that the demand for labor has shifted in recent years towards medium-skilled workers, but the vocational education and training system has remained unable to provide people with the skills required by employers.[21] This leads to skill mismatches on the one hand, and skill shortages on the other. In addition, the low interest of students who have completed primary education in enrolling in secondary vocational schools is an additional problem. This challenge should be taken into account during any efforts to create green skills among students in secondary vocational education. Facing this challenge and overcoming it can be achieved by accelerating the reform of the vocational education and training (VET) system (as set out in the *2013-2020 Vocational Education and Training Strategy*, Improved Skills for a Better Tomorrow) and strengthening of post-secondary non-tertiary VET programs for people to acquire the skills required in the labor market.

2.4. Drivers of green skills creation in the Republic of North Macedonia – opportunities and limitations

2.4.1. Energy efficiency and the use of renewable energy sources as drivers

The energy sector has an adverse impact on the environment, but at the same time it offers great opportunities for environment improvement through the use of renewable energy sources and energy efficiency.

In the case of Macedonia, the previous position is confirmed because this sector has the biggest contribution to environmental pollution. Namely, about 90% of primary energy is generated from fossil fuels, mainly lignite and fuel oil. Also, this sector participates with more than 70% in total greenhouse gas emissions, having a similar share in local pollution. This is due to the fact that gross domestic energy consumption still depends on fossil fuels, although their share decreased from 92% in 1990 to 79% in 2016. Also, the share of renewable energy sources has doubled (7.5% in 1990 and about 15% in 2016). The rest of gross domestic consumption is covered by electricity imports, which increased from a negligible 0.2% in 1990 to 6.5% in 2016. In 2016, gross domestic consumption was by 7% lower than that of 1990. In the past, the most dominant fuel in the country was coal (mainly lignite), which accounted for almost 45% of gross domestic consumption. The situation changed in 2016, when petroleum products became the main energy source with a share of 40%, while the share of coal decreased to 33%. Final energy consumption does not follow the same trend as gross domestic consumption. In 2016, petroleum products accounted for the largest share of final energy consumption (49%), followed by electricity (29%), biomass (10%), coal (7%), heat (2%) and natural gas (2%). The energy system efficiency, presented by the ratio between final energy consumption and gross domestic consumption, increased to almost 70% in 2016, which is by 10 percent more than in 1990. This value is now almost the same as the value in the Member States of the Organization for Economic Cooperation and Development (OECD) in Europe, where it is about 70%. (*Third Biennial Update Report on Climate Change, 2020*, p. 42)

[21] It is estimated that currently, around 30 percent of all workers possess skills that are not suitable for their jobs.

It is generally known that Macedonia is poor in its own energy sources, which results in its dependence on energy imports. The lack of energy resources is very pronounced, so the country meets its overall needs for oil, natural gas and even quality coal, by imports. What is worrisome is the fact that in 2000, the import of electricity also started, so in the last year or two, as a result of the energy crisis, this import has further intensified, thus intensifying the negative impact on the trade balance.

In fact, Macedonia has a relatively high dependence on electricity imports if one views the situation in the region. Electricity consumption in Macedonia was decreasing from 2010 to 2016 at an average annual rate of 3.7%, mostly as a result of industry consumption. Despite the decrease in consumption, the average share of imports during the considered period is about 30% of the total electricity consumption. Compared to countries in the region, Macedonia, together with Croatia and Slovakia, has one of the highest shares of electricity imports in total electricity needs. (*Strategy for Energy Development in the Republic of North Macedonia until 2040*, 2019, стр. 19).

With this in mind, it is understandable that one of the inevitable alternatives for assessing the current possibilities of creating green skills in Macedonia leads to the analysis of the potential market for energy efficiency (EE) improvement services, primarily in the residential sector.[22] Again, the analysis should take into account both sides of the market, the supply side of such services and the demand side (primarily the households' needs for higher energy efficiency).

The analysis of the supply side should identify the circumstances in which the economic entities offering services related to energy efficiency promotion in Macedonia operate. Moreover, when energy saving at the average consumer level is concerned, apart from the residential sector, 3 more priority sectors can be highlighted: the manufacturing industry, the trade and service sector, and the transport sector.

The conventional approach suggests that analytical activities in the energy sector are primarily aimed at finding new energy reserves or new energy production and transmission systems. Typically, energy efficiency is left up to end users. This approach is present in this case, as well. Namely, despite the numerous possibilities for reducing the amount of energy required to perform certain activities, a small number of studies focused on the energy efficiency issue were registered in our country in the past. In fact, in the case of our country, a negligible amount of research has dealt with possible breakthroughs in the market or the distribution of products that use less energy (energy-saving products). *The Rulebook on energy efficiency of buildings*, (2008), was the first more important step in the direction of energy consumption control and designation of buildings and structures with the highest value of heat penetration determined in conditions of their insulation. However, it should be noted that these rules are voluntary and not mandatory.

Consequently, it can be noted that the level of public awareness regarding energy efficiency and expected economic benefits from it are at an unsatisfactory level in our country. They are limited to the activities of a small number of professionals, with a relatively low expected outreach. Therefore, it is necessary to increase the number of such promoters if one wants to expand local influence and have energy efficiency methodologies and practices implemented by the most significant entities in the energy sector.

The small number of professionals active in the field of energy efficiency in Macedonia does not allow for their characterization as a satisfactory critical mass of experts. Therefore,

[22] According to the "Third Biennial Update Report on Climate Change" (Ministry of Environment and Spatial Planning of the Republic of N. Macedonia, 2020, p. 111-113), by 2030, around 8,000 green jobs are expected to be created in our country, or about 10,000 by 2035. It is assumed that energy efficiency policies and measures will have a major contribution to this, with approximately 77% of the total number of green jobs created. Of that, the reconstruction of existing residential buildings would account for 42%, the construction of passive houses would participate with 21%, the no-incentive use of renewable energy sources with 6%, and solar thermal collectors would contribute 8% to the green jobs created.

their number needs to be extended and increased. In this sense, the State or the Government, has the task of ensuring adequate utilization of the potential for knowledge transfer, thus laying the foundations for developing skills and knowledge within the business community, as well as opportunities to upgrade and develop businesses in this area.

Countries facing the priority of the energy efficiency issue are growing in their numbers. Most of them have realized that EE can be applied in the short to medium term. In doing so, the increase in business activities in this direction and the increase in the number of adequate jobs is taking place according to proportionate rates in a number of sectors at the national economy level.[23] In this case, it is about the fact that energy transformation as a whole, and particularly, energy efficiency enhancement (or the reduction of energy consumption per unit of product) has a significant impact on the economic and financial performance of enterprises and the overall economy. Namely, when talking about energy transformation and investments in the energy sector, the induced and multiplier effects of energy on the country's economic growth should be taken into account. Thus, these investments will generate new jobs, i.e., they will directly increase employment in the new energy facilities, and they will also have induced or multiplier effects on employment.[24]

According to the estimates of the World Bank and its experience in Macedonia, investments of 1 million euros in the field of energy efficiency could create 10-30 jobs, emphasizing the possibilities of hiring skilled or unskilled workers from the local community.[25] At the same time, it is interesting to note that "although energy efficiency activities imply the development of new technologies, such technologies are already proven and well established, and they do not require skills greater than those usually encountered in industrial and commercial activities. Providing additional skills training for staff to apply energy efficiency methodologies and practices is relatively simple and cost-effective." (*Strategy for Improvement of the Energy Efficiency in the Republic of Macedonia until 2020*, p. 46)

As previously mentioned, as far as the demand for this type of service is concerned, the analysis is initially focused on the household sector. Basically, Macedonia has relatively low energy consumption per capita and at the same time, very high energy consumption per GDP unit in all sectors. Regardless of this, it is known that Macedonia is very dependent on energy imports.

In terms of energy utilization per GDP value of one thousand dollars (expressed as an equivalent of oil kg), in the last fifteen years, there has been a decline greater than the average decline in the Western Balkan countries, from 150 kg in 2000 to 102.7 kg in 2014. Compared to the EU average, Macedonia has been using more energy per unit of generated GDP in the last fifteen years, on average by 30% more. This difference decreased particularly in the period of 2013 and 2014 to 18% and 17%, respectively. (Eco-awareness, 2019, *Economic analysis - transition to lignite-free development: the case of Oslomej*, p. 12).

The primary energy consumption has a downward trend, while the final energy consumption is stable. In the 2011-2017 period, the consumption of primary energy decreased

[23] A comprehensive study of municipal building modernization in Canada performed by the Federation of Canadian Municipalities estimated that each 1 million dollar investment in building modernization creates 20 new jobs over a 1-year period, primarily in construction works. The duration, specific types of jobs, and the number of jobs in the construction phase, may vary from one project to another. Depending on the project, the specific areas of work and types of jobs at this stage could include different positions.

[24] Economic logic dictates that each newly employed person creates additional employment through the multiplier action. Namely, the newly hired persons will receive wages. They will save part of their wages and spend part of it. The part of the wages spent will increase the demand for consumer goods, which is why the enterprises producing these goods, in order to respond to the increased demand, will have to hire new people or create the so-called secondary employment. Following a similar logic, tertiary employment is also created, etc. Furthermore, a multiplier effect on employment (preserving existing jobs and creating new ones), in addition to sectors producing consumer goods, also occurs in other economic sectors, such as for example, in construction, in domestic companies that would supply inputs required for the construction of new energy facilities, etc. (Program for implementation of the 2021-2025 Energy Development Strategy, p. 147)

[25] Sekjerinska Liljana, Activities in the field of energy efficiency supported by the World Bank, presentation at the conference "Encouraging Energy Efficiency in the Republic of Macedonia", Ministry of Economy, 12 September 2012, Skopje.

by 12.6% mainly due to the increased import of electricity and oil products, as well as the implementation of measures for energy efficiency and increased production of RES electricity. Final energy consumption remained stable with a few variations, mainly due to the fluctuation in industry and weather conditions. (Strategy for Energy Development in the Republic of North Macedonia until 2040, 2019, p. 27)

Energy consumption is concentrated in five sectors, including: industry, households, transport, trade, and the service sector. Compared to developed European countries, Macedonia has a very low share of natural gas as opposed to the high electricity consumption. This is noted specifically in the case of households.

The analysis of energy consumption in *households* for different purposes may be important in terms of determining future demand in the following period. In order to obtain realistic data on energy consumption, the unit of analysis can be an ordinary family. This is due to the fact that energy consumption per capita in this sector has a lower representativeness level, if one takes into account the fact that the consumption in the family mainly depends on the apartment features (heating, light, kitchen appliances, with the exception of hot water, where the number of family members is not crucial).

Energy consumption in Macedonian households, expressed per capita, is quite low and virtually does not change over a long period of time. However, energy consumption in households in Macedonia is quite high when calculated per unit of GDP. In fact, household energy consumption per GDP unit in Macedonia is several times higher than the average for developed European countries (for example, in 2006, it was even 4 times higher). This indicates that despite the relatively low consumption per capita, more attention needs to be paid to energy efficiency measures in households, or to reducing households' energy consumption relative to economic power (Strategy for Energy Development in the Republic of Macedonia until 2030, p. 63).

The number of apartments/houses is not taken as a number of energy consuming units. Instead, it represents the number of households in a country and this number does not cover empty dwellings such as holiday homes, which have no ongoing energy consumption. This means that there are more dwellings than families in the country.

Table 4: Dwellings and households in Macedonia

	Unit analyzed	**Household**
1.	Number of households	564,296
2.	Number of dwellings	697,529
3.	Average number of family members	3.6
4.	Average surface area per household	70.6 m^2
5.	Average number of rooms in urban dwellings	3 rooms
6.	Age of apartments (period of construction)	
	Before 1919	1.11%
	1919 – 1945	3.95%
	1946 – 1970	30.12%
	1971 – 1989	47.80%
	After 1991	17.02%

Average energy consumption per household 0.96 toe/year.

Source: Ministry of Economy of the RM (2011): *Strategy for Improvement of the Energy Efficiency in the Republic of Macedonia until 2020, Skopje,* p. 76.

According to numerous statistical surveys, in the average Macedonian family, more than half of the total energy consumption is used for heating, more than 20% for the operation of household appliances (oven, refrigerator, vacuum cleaner, washing machines, air conditioners, fans, TVs and computers), as well as a portion thereof is intended for street lighting, then more than 10% for water heating and the same amount for lighting. In summary, the energy for heating the home takes the largest part of energy consumption. Nevertheless, this analysis should take into account the movement in net wages. Data shows that in the last 15 years, salaries have increased on average by approximately 5% annually, while the cost of living has increased by approximately 3.5%. Hence, the average Macedonian family will have around 20% of the average salary at their disposal after meeting their usual needs.

The analysis of the possibilities for reducing household energy consumption indicates a demand that can positively influence the creation of green jobs, and through them, the demand for green qualifications and skills as well. In addition to the standard factors (standard of living, number of apartments/homes built, population and number of families), individual types of measures (including primary and secondary legislation, training, promotional materials) aimed at improving energy efficiency, have their own contribution in this context, particularly in terms of household appliances and homes, and automated energy consumption control. It is interesting that research on this issue conducted in some of the neighboring countries points to the existence of similar energy consumption inefficiency in the heating of buildings, as was registered in our case.

In these circumstances, in the last decade and a half, Macedonian society has noticed an increased interest in the energy efficiency (EE) issues and renewable energy sources (RES) use. This argument is supported by a range of activities related to the modest but continuous penetration of RES, and also the increased and improved energy efficiency. In this regard, the introduction of preferential tariffs for the use of RES and the preparation of the First National Energy Efficiency Action Plan can be mentioned.[26] There are also financial incentives and support for the solar energy use for heating, preparatory activities in the direction of greater use of geothermal energy, waste biomass and biogas energy, where all this results in greater donor interest and a greater number of credit lines.[27] Finally, in June of this year, in response to the growing problems with the electricity supply in our country (caused by various reasons of external nature, primarily as a result of the disturbed energy markets' balance, the war in Ukraine, etc.), the Ministry of Economy adopted some changes to the Rulebook on renewable energy sources, where households and businesses may have photovoltaics installed for electricity production according to a relatively simplified procedure.[28]

These aspects send positive signals for the acquisition of green qualifications and skills on the part of the workforce. However, this is limited due to a certain number of shortcomings in relation to raising the energy efficiency issue. Some of the most important ones are as follows:

- *Population's weak purchasing power for energy efficiency investments.* With 5,423 euro gross domestic product (GDP) per capita in 2019, our country is included in the group of countries with low GDP and low economic power for investment.[29] To understand the current situation, just one reminder is enough: in 2006, Macedonia's GDP fell to the same level as in 1990 and it lagged significantly behind the level of GDP in developed countries, but also behind that of less developed countries in Europe.Of course, all this is reflected in households' economic power to undertake energy efficiency investments in the residential sector.

[26] Ministry of Economy of the Republic of Macedonia (2011): *First Energy Efficiency Action Plan of the Republic of Macedonia until 2018, Skopje.*

[27] In order to promote renewable energy sources, in recent years, the Ministry of Economy has implemented an incentive measure that compensates part of the costs for any solar thermal collector systems purchased and installed in households. Together with the strategic documents and action plans adopted in this sector, measures and activities for energy efficiency promotion in the sectors of final energy consumption (including the residential sector, commercial and service sector, industry and transport) are foreseen, as well as draft measures for energy efficiency promotion in primary energy consumption sectors. *(2014-2020 Strategy on Environment and Climate Change, p. 22).*

[28] See: Rulebook amending and supplementing the Rulebook on renewable energy sources, Official Gazette of the RNM, no. 138/2022.

[29] State Statistical Office (2021), News Release - Gross domestic product of the Republic of North Macedonia in 2019 - definitive data, Skopje, p. 2.

- *Complex secondary legislation on energy efficiency and RES use.* The secondary legislation relevant to the efficient energy consumption and RES use is still rather complicated. It is necessary to remove those administrative obstacles that make it difficult to realize projects and make such projects non cost-effective.

- *Questionable institutional capacities.* The capacities of relevant institutions (including the Ministry of Economy and its energy sector, the Energy Regulatory Commission, the Energy Agency, and local government units) and their coordination, in certain cases, seem insufficient for the efficient implementation of the energy sector legal framework. Hence, the result is often an unnecessary complexity of procedures and actions for the implementation of initiatives regarding RES use, as well as when introducing new technologies in the energy sector.

- *Low energy efficiency in energy generation, transport, distribution and consumption.* The energy sector in Macedonia registers high energy consumption per unit of GDP, with a small positive exception in the low energy consumption per capita. This situation is a result of the lack of investments over a longer period of time, including the: outdated equipment for energy generation, distribution and use; lack of incentive measures for energy saving; and also the lowered interest in energy savings resulting from the unrealistically low power price until a few years ago; then, the high energy distribution losses, and the lack of awareness-raising campaigns regarding the importance of energy, its price and the need for its prudent consumption.

- *Methodological barriers*. The official statistical methodology in our country is still facing dilemmas in relation to recording green jobs, and thus, green skills, as relevant categories.

Despite the drawbacks listed, in the Republic of North Macedonia, there are still opportunities for the implementation of energy efficiency projects and, based on that, for the creation of green jobs and green skills. Some of them are the following:

- *Macedonia's membership in the Energy Community.* The relevant Energy Community Treaty obligations to ensure compliance with the energy efficiency acquis are at different levels of implementation, but the membership in this Community enables Macedonia to cooperate directly with other Member States in terms of creating a stable regulatory and market framework as a good basis for attracting investments in the transport and transmission infrastructure for natural gas and electricity, and also investments in power generation facilities. This allows for the development of competition, liquidity and utilization of economies of scale, and no less important is the fact that Treaty establishing the Energy Community gives special significance to the environment improvement related to natural gas and electricity through EE and RES enhancement.

- *Additional employment in the energy sector and engagements of other domestic companies.* The implementation of major energy projects opens up opportunities for domestic companies to get involved in turning into reality certain segments such as manufacturing and construction. Activities in the field of EE and the use of RES and natural gas in households, creates space for engaging a large number of cooperative small and medium-sized enterprises.

- *Energy efficiency is economically feasible.* EE can be very important for the national economy, as it has the capacity to create new jobs, improve the quality of life and reduce energy imports. In addition, EE influences the environmental protection and is economically feasible under certain conditions. Thus, according to the expert

community opinion, "one euro invested in energy efficiency provides an investment saving of 2.2 euros in energy supply."[30]

- *High power consumption in households.* Over the years, the low cost of electricity has led to its relatively high share in the total energy consumption of households. This growth was continuous, even twice as high compared to that of European countries. The current energy crisis has imposed the necessity of a serious reduction in electricity consumption among all consumers.

The points mentioned have a strong impact on encouraging the creation of green skills not only among the workforce hired, but even more so among young people who are in the process of their school preparation within secondary vocational education.

2.4.2. Industry Impact

Industry takes a very important place in Macedonian economy. This is confirmed by its share in the Macedonian GDP structure, amounting to more than 20 percent. If Macedonian industry structure is viewed, it can be seen that several branches have the greatest impact on the environment, including: metallurgy, chemical industry, pharmaceutical industry, food and beverage production, wood and paper processing, etc.

As to the negative effects on the environment, illustrative enough is the data showing that industry accounts for about 30 percent in the total emissions of sulfur dioxide and about 14% of the total average annual emissions of nitrogen oxides. However, the share in the annual emissions of volatile organic compounds is much higher (38%), while the share of solid particles in the annual emissions is the largest, or about 60%. (*2014-2020 Strategy on Environment and Climate Change*, p. 23). If one takes into account the fact that industry and energy together are responsible for about ¾ of the total greenhouse gas emissions in Macedonia, then it is clear that relevant policymakers are faced with the imperative of introducing and applying the EU ETS (EU Emissions Trading Scheme related to GHG).

The industry sector companies in Macedonia have an obligation to implement emissions-reducing measures in all environmental media. The most striking example of this includes the permits for integrated pollution prevention and control (IPPC), then the obligations to introduce best available techniques, etc.

In principle, policymakers are guided by the respective strategic documents. Until a few years ago, it was the Industrial Policy of the Republic of Macedonia (2009-2020), according to which the Government led a proactive industrial policy. By this policy, the industry was encouraged to make products with greater added value based on knowledge (knowledge-based production), innovation and cooperation. Thus, the creation of authentic industries and activities such as: organic wine and food, information and communication technologies, medical equipment and services was partially enabled, and the development of authentic tourism and other business activities was also supported. (*2014-2020 Strategy on Environment and Climate Change,* p. 24) Certainly, this should be a suitable basis for creating a demand for *green skills* in the near future.

In the near future, Macedonian industrial companies can be expected to mitigate their negative environmental impacts by using "best available techniques" (according to the EU Industrial Emissions Directive). Also, in order to achieve sustainability, environmental policymakers

[30] Filkoski V. Risto, Energy efficiency in industry – multiple benefits, Power Point presentation at the conference "Encouraging Energy Efficiency in the Republic of Macedonia", Ministry of Economy, 12 September 2012, Skopje.

can be expected to insist on the improved use of environmental management systems. Most likely, polluting industrial companies will be required to pay attention to energy efficiency (if this is not already their regular practice given the events of the last few months followed by the energy crisis!). In this context, the intention is to adopt a regular practice of annual reporting on the amounts of energy consumed per unit of product. As regards the consumption of water, other raw materials and emissions to the environment (e.g. carbon dioxide), adequate intensity guides are developed.

2.4.3. Construction and green skills creation

Construction is an impactful sector in the Macedonian economy. Its base consists of micro and small enterprises specialized in certain market segments and certain construction process segments. This is a significant difference compared to the period before the start of the transition process (early 1990s), when large companies where subsistence was found by several thousands of people started their overall transformation. The privatization process during the 1990s caused structural changes that were most felt by these large companies, where the number of their employees was reduced multiple times (under 1,000 employees on average).

Today, the construction industry employs more than 50,000 employees (more precisely, around 54,380 in 2021).[31] The majority of them are engaged in the high-rise construction sector (construction of buildings), not counting those engaged in the processes of installations and finishing works. So, the number of persons employed in the construction sector has been increasing in recent years, reaching its peak with a share of 6.5% in the total employment in Macedonia, or 8% in the private sector. As a reminder, in 2011, a total of 45,000 people were employed in the construction industry, while in 2017, around 53,391.[32] In terms of education, in general, about 10 percent of employees have a higher education (engineers), 15 percent have a secondary education (technicians), and the rest are skilled workers or workers with low qualifications (unskilled workers).

The conditions in Macedonian construction until some time ago caused numerous dilemmas regarding the treatment of green jobs in this sector. Namely, "the dilemmas and issues arising particularly in the construction sector relate to which jobs, from high-skilled jobs to low-skilled jobs, will be recognized as green jobs? In general, the conclusion is that if the buildings use the appropriate type of building materials that meet the energy efficiency standards, then everyone involved in the workforce chain, from the manufacturing of materials, to their application and virtual installation, can be characterized as a chain of green jobs. This would mean that all jobs, from high-skilled jobs (civil engineer) to low-skilled jobs (façade installer and plasterer) would qualify as green jobs. Additional education of the existing workforce (for example, builders, electricians, etc.) is also required to increase awareness and knowledge about energy efficiency." (Jovanovski A, p. 55).

[31] According to the State Statistical Office.

[32] State Statistical Office (2018), Labor Force Survey 2017, Skopje, p. 49.

Box 2: Estimated number of workers who need green qualifications and green skills

The Strategy for Improvement of Energy Efficiency in the Republic of Macedonia until 2020 (Ministry of Economy of the Republic of Macedonia 2011, Skopje), provided that for the realization of the European Union recommendations, in the period 2012-2020, for the reconstruction of the housing stock and public buildings by implementing energy efficiency (EE) measures and for the implementation of renewable energy sources (RES), about 200 million euros per year would be needed, of which 166 million euros per year for the private housing stock and 39 million euros per year for public buildings. Starting from these assumptions, the analysis *Build Up Skills Macedonia - Report on Construction Sector Capacity in the Area of Energy Efficiency and Renewable Energy Sources* (Macedonian Chamber of Commerce, Energy Agency of the Republic of Macedonia, Creation, Skopje, December 2012) has given an estimate of the workforce required to implement the necessary EE measures in the high-rise construction sector according to the time required for the reconstruction of any surface area expressed in m2 and cost per day of labor. The pace of reconstruction of existing buildings was foreseen to take place at a rate of 2.9% per year for the private housing stock and 5% for public buildings, including the construction of new buildings (both residential and public ones), but in accordance with the then registered trend.

The total amount of labor directly engaged in the construction sector and required for the construction of new energy-efficient buildings or renovation of existing buildings in order to bring them into line with EE and RES was 52,400 workers. On the other hand, the then number of workers directly engaged in construction amounted to about 43,600. The cross-referencing of this data shows that there was room for employment of an additional *9,000 workers and their direct involvement in the construction industry through training and acquisition of skills for the use of EE or RES equipment* (Build Up Skills Macedonia, ibid., p. 39).

Some analyses of the situation in the construction sector until a few years ago indicated insufficient interest of construction companies in increasing their activities regarding energy efficiency and greater use of renewable energy sources. Pressures coming gradually from higher energy prices and the need for training of workers in the area of energy efficiency and renewable energy sources, negatively affect the profitability level and raise the construction costs and work efficiency. The low interest in training of workers stems from the additional costs for enterprises that arise due to sending their employees to training (absence of workers during training, higher amounts of wages due to higher qualifications of employees, etc.).

As far as predictions for any future trends are concerned, the views and scenarios contained in the *Third Biennial Update Report on Climate Change* (2020) are interesting. Namely, this Report indirectly points to the needs for new green skills in the construction sector, with a view to the predictions of the emergence of green jobs (this is contained in a section that has a relatively inadequate title - Social Aspects). It is predicted that in 2030, the maximum number of new jobs in the WEM scenario will be around 5,309 green jobs, in the WAM scenario the maximum number of new jobs will be around 7,035, while in the e-WAM scenario – in 2035 that number would be 9,895. All three scenarios agree on the activities "... that contribute most to the creation of domestic green jobs, such as Renovation of existing buildings (they create almost 50% of new

jobs in 2035 in the e-WAM scenario), followed by Construction of new houses, including passive houses (23%), Implementation of photovoltaics (10%) and Installation of solar thermal collectors (8%). After 2036, there is a drop in the creation of domestic green jobs mainly due to the reduced number of photovoltaic installations, and less frequent renovation of existing buildings." (*Third Biennial Update Report on Climate Change*, pp. 111-112)

Considering the above, it is interesting that the Construction Law (2009) contains several important articles regarding the issue of energy efficiency. Namely, according to this law, the structure/building and the heating, cooling and ventilation thereof shall be in accordance with the microclimatic conditions of the location where the structure/building is located (Article 9). They shall ensure that the energy consumption is equal to or lower than the prescribed level and meets the energy efficiency requirements. It is also important to note that when it comes to performing interior design activities in the building, such as installing lights, painting, flooring, putting tiles, doors and windows, plumbing, landscaping and other craft activities, in order to fully respect the standards prescribed, the contractor shall be registered with the Central Registry. (Article 25)

Educational institutions are not yet accredited to provide complete EE and RES training. They are lagging behind in terms of ensuring trainers, identifying trainings that would lead to tests for the recognition of qualifications acquired and in terms of the ability to provide crash courses that would valorize the participant's knowledge. Hence, it should come as no surprise that the supply of labor force from the formal educational process for the occupations related to civil engineering and geodesy (civil engineering technicians and surveyors) is unable to meet the respective demand. Namely, "it can be noted that there is a serious lack of labor supply from the civil engineering and geodetic profession, which, on the other hand, is a reflection of the low interest of students to prepare for the profession, especially through the three-year education. This is a critical situation because the labor supply coming from formal education, is not even close to being sufficient to meet the needs of the labor market, considering that almost 6,000 workers are needed annually. These data indicate that the construction sector has met its need for labor from other alternative sources. One of those sources is informal education and adult education." (Jovanovski A., p. 74-75)

Workers who are directly employed in these activities have a low profile, they are paid low wages and are not interested in improving their skills in relation to EE and RES. They see the possible training as a waste of time and a loss of potential earnings, and they are also unaware of the possibility of their earnings increasing as a result of their certified qualifications.

2.4.4. Agriculture impact

According to the experiences of many countries, agriculture is not a sector where the new green skills penetrate quickly. Namely, "programs for new skills in agriculture are generally oriented towards ensuring higher efficiency in food production rather than promoting and adopting environmentally sustainable production systems. Poor coordination, the lack of proper identification of the needs for such skills, the slow involvement of social partners and poor working conditions, are all key challenges that need to be overcome if we want to green the agriculture." (ILO, 2018, p. 144)

Agriculture is still a significant activity in the Macedonian economy. This is supported by the fact that the agriculture share in the Macedonian GDP is around 10% (for example, 8.9% to 12.8%, for the period 2005-2012). Therefore, in 2007, the Government adopted a *National Strategy for Agriculture and Rural Development*. It establishes the principles of support policies and

measures adapted to the expected changes in legislation, institutions and control systems. In the same year, the Government adopted the *National Strategy for Organic Agricultural Production (2008-2011)*. It laid the foundations for the introduction and development of organic agricultural production.

In the *National Program for Agriculture and Rural Development (2013-2017)*, rural development policies and measures are noted. Also, the environment protection and improvement are identified as a significant priority area. This Program is targeted towards providing support by which promotion of farming practices shall be ensured for the purpose of sustainable agricultural land use, including protection and improvement of the environment and rural areas in order to preserve plant and animal diversity and improve soil, water and air. (Environment and Climate Change Strategy 2014-2020, p. 24)

According to official statistical records, slightly more than half of the total area of the country accounts for agricultural land (51%). More than 20% of this contingent is arable land (22%), and less than 30% is grazing land (29%). The number of agricultural holdings is around 190,000 (we are still waiting for the results of the last census!), and they cover more than 330,000 hectares of agricultural land. Here, the average agricultural land size per individual agricultural holding is under 2 hectares, which speaks of the unprofitability of these holdings. In addition, the land available to the holdings is fragmented into a large number of plots, with a tendency to further decrease the average size of such plots (0.12 - 0.3 hectares). Considering that about 40 percent of the Macedonian population is rural, where a large part thereof has limited opportunities for employment in non-farming activities, a wide space is created for training on green skills for a significant part of the workforce engaged in agriculture, especially considering the confirmed intentions for the development of our agriculture to move in the direction of organic production.

The data on the pressure of Macedonian agriculture on the environment and climate change can serve as a confirmation of the previous point. Namely, agriculture has an impact through ammonia emissions in the air and greenhouse gas emissions: CH_4, N_2O and CO_2. Thus, 99% of the total national NH_3 emissions are from the agriculture sector and it is the second largest source of greenhouse gas emissions. Greenhouse gas emissions from the agricultural sector account for 8-15% of total emissions and consist of methane and nitrous oxide. (*Environment and Climate Change Strategy 2014-2020,* p. 25)

2.5. Educational system and formal qualifications acquisition – green skills supply

2.5.1. Institutional setup

The secondary education subsystem contains four types of education: high-school, secondary vocational education, artistic education and education for students with special educational needs. In this research, special attention is paid to vocational education and training (VET).

Vocational education consists of and can be implemented as: a) vocational training lasting up to two years (acquiring the second level of qualifications, where its completion is regulated by taking a final exam); b) education for occupations, with a duration of three years (acquiring the third level of qualifications after graduation, where its completion is regulated by passing a final exam without the possibility of enrolling in a university); c) technical education lasting for four years (acquiring a fourth level of qualifications after graduation, where its completion is regulated such that students completing the four-year vocational education can choose to either take the final exam or the state matura (graduation exam), depending on whether they want to continue their education or not); d) post-secondary vocational education (acquiring the fifth level of qualifications that includes specialist education and the master's exam). We can also include higher vocational education here (public and private higher vocational schools and vocational university programs that are not part of academic programs).[33]

The lowest-level form of vocational education or Vocational Training (VT) is aimed at adults who are part-time students and young people who are regular students, and it allows the acquisition of the second educational level of qualification according to the National Qualifications Framework or job training. The most frequent users of this possibility are persons with or without completed basic education, where they can attend both types of education in parallel. On the other hand, the post-secondary VET is not yet properly established in higher education. Although there are higher vocational schools (either independent or as part of universities), they are regulated by the Law on Higher Education, which unfortunately does not make a clear distinction between vocational and academic institutions and programs. In fact, in the process of universities' reform, the emphasis was placed on academic programs, while the vocational programs did not have a clear direction, so they ended up as being fewer in number than before.

Very important institutions in the education system include the Bureau for Development of Education (BDE) and the Center for Vocational Education and Training (CVET). The Bureau for Development of Education is a body within the Ministry of Education and Science (MES) in charge of professional matters important for improvement of upbringing and education development in the country. In this context, one might mention the monitoring, professional inspection, research, promotion and development of educational activities in the area of pre-school, primary, high-school and arts education, then, secondary vocational education (development of general education courses' curricula and provision of opinions on vocational courses' curricula), post-secondary education and education for children with special educational needs. In support of the foregoing speaks the fact that the BDE takes care of curricula and programs, research in education, including teachers and their professional associates' professional and career development, as well as publication activities.

[33] The master's exam has not been active for several years now, and it has been decreasingly used as a way to upgrade one's education (in 2011, there was no student at all). The stir-up and interest in passing a master's exam has been noted in the last three years. The specialization (that lasts for 1 year) provides for deepening one's vocational knowledge and acquiring sets of operational skills. This type of education has been showing a number of weaknesses for some time.

As to the Center for Vocational Education and Training (established in 2007), it is responsible for the analysis and study of vocational education systems, then, the development of occupational standards, development of vocational qualification standards, curricula, teaching and exam programs, etc. It is important to note that CVET shall provide support to social partnership and promote vocational education and training with the aim of improving the attractiveness of this part of education. In support of this is the fact that, in addition to MES, in its management also participate (through their representatives in the Management Board), the Ministry of Labor and Social Policy (MLSP), the Chambers of Commerce, the Chamber of Crafts of the Republic of Macedonia and the Association of Local Self-Government Units of the Republic of Macedonia (ZELS).

Certain analyses point to some partial inconsistency and overlap of competences of individual bodies and institutions operating in this sector. Most often, changes in regulations were not followed by timely changes in by-laws, particularly the ones regulating the competences and responsibilities at the national, local and school levels, thus creating contradictions and inconsistencies in the implementation of legal provisions and slowness of interventions. The most obvious example of such inconsistency is the lack of accurate stipulation of competences of the Center for Vocational Education and Training, the Bureau for Development of Education, the Center for Adult Education and the State Education Inspectorate (Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-2020, with a 2013 Action Plan, p. 27).

2.5.2. Strategic aspects of the vocational education and training subsystem

International experiences speak of a generally weak and insufficient presence of green skills in vocational education and training (VET). "It is assessed that this is a result of the mismatch of VET with environmental protection policies and national development strategies, but also the disconnection between VET institutions and the economy. In a large number of cases, green transition training is provided by employers, mainly because they are directly exposed to the changed skills needs, and partly due to the insufficient development of adequate training within the formal VET system. Therefore, the proper communication between the private sector and the formal VET system is crucial to helping the economy adapt to green skills needs in the long term." (ILO, 2018, p. 140) A step forward in this area was made in our country by the 2019 vocational technical education reforms supported by the World Bank, where almost every qualification contained programs on both working environment protection and environmental protection, studied individually and compulsorily, including a cross-curricular approach to addressing this subject matter in vocational programs.

One of the most important strategic documents for the education system, the *2018-2025 Education Strategy* (supplemented by an *Action Plan*, 2018), contained a vision for providing comprehensive, inclusive and integrated education. The center of attention was the student, who, assisted by modern curricula, was supposed to acquire contemporary knowledge, skills and competencies in line with the challenges and needs of society and the labor market.

This vision was translated into the Strategy's main *goals*, including:

- Improve educational infrastructure to ensure greater inclusivity, accessibility, ***energy efficiency*** and digitalization; and
- Rationalize and conceptually regionalize secondary vocational education by programs based on generic and key competencies and oriented to the labor market needs.

In the first goal, it is noticeable that the education infrastructure should be subject to improvement with a focus, among other things, on realizing a higher energy efficiency level. Although here energy efficiency is not identified in the curricula and programs (except in certain qualifications) as a topic that should be the basis for the acquisition of new skills by students, still its presence means a shift in a positive direction.

The main goals of the *2018-2025 Education Strategy* were accompanied by a series of *outputs/results* foreseen by one of the key national strategic documents (i.e., by the National Employment Strategy 2016-2020). Also, a very significant output/result in this context is the one referring to the introduction of special adult education programs for acquiring new skills for "green" job positions. This is accompanied by the new stage in the modernization of secondary vocational education and training (VET) that started in 2015 through the Skills Development and Innovation Support Project. This initiative was aimed at reforming the four-year technical education and incorporating mechanisms for *an adequate and timely response to the labor market needs*.

Giving attention to matching the skills acquired by students in their vocational education was further confirmed by the assessment of labor market skills needs. In doing so, information was obtained from employers about the needs for new hires in the short term (6-12 months). By using this research for the needs of the *2018-2025 Education Strategy*, knowledge was gained about several aspects related to the labor market: conditions and expected changes in the labor market, needs for skills that new job candidates should possess, needs for workers in some occupations where employers felt a shortage while filling their vacancies, etc. This is an example that should obviously be followed in continuity. Research and analysis of labor market skills needs provide some valuable short-term indicators regarding employers' expectations in terms of new hires and skills needs that make job-seekers competitive on the labor market. Certainly, in this context, the needs for *green skills* should also be placed, which would thus receive their own verification on the labor market.

Considering the above, the challenges that vocational education and training are facing under the *2018-2025 Education Strategy* seem to be completely understandable, of which the following can be noted as more important:

- After 2010, in Macedonia there was a discrepancy between the supply of staff from the VET system and the demand on the labor market. The reason for this was found in the system introducing new qualifications in vocational education and training, which was assessed as inflexible and ineffective. In addition, cooperation with the economy in terms of establishing concrete practical training for students and learning through work was assessed as insufficient and ineffective. The business was criticized as not showing sufficient initiative towards occupational standards as the starting point for adequate and up-to-date vocational education. In particular, such standards were insufficiently initiated by companies (the business community), while the procedures for preparing occupational standards were insufficiently productive.

- In this period, it turned out that companies and employers did not show sufficient motivation to accept students for practical training. Namely, in spite of the respective provisions in the VET Law, which stipulate possibilities for employers to accept students for practical training and in return to enjoy various benefits in the form of fiscal, customs and tax relief, such provisions were rarely adequately implemented in practice.

Finally, according to the *2018-2025 Education Strategy*, the advancement of the vocational education and training sector shall be based on a number of priorities and expected outcomes/results, of which the most interesting is the first priority, under which it is necessary to *harmonize the vocational education and training with the labor market needs*. The importance of this priority is reflected in the expectation of vocational education and training to promptly adapt to the

changeable needs for labor market skills. In order to achieve that, the VET system itself is expected to be continuously informed on the labor force demand structure, that is, the qualifications and skills that are in demand on the labor market in the given period.

Starting from these priorities of the vocational education and training system, it is no surprise that a few years earlier, the *Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-2020,* with *an Action Plan* (2013) raised the issue of reforms in vocational education and training towards lifelong learning. This Strategy emphasized the importance of mobility as one of the leverages for improving the quality, effectiveness and efficiency of education and training. Namely, "the economy in the past sought its competitiveness in mass production, cheap labor, raw materials, energy, technology... today's economy seeks its competitiveness and essence in digital technology, knowledge and innovation." It is entrepreneurially oriented and reinforced by interconnection and unification of businesses and strategic partnerships... Work today is cognitively more complex, it requires teamwork and collaboration, and it is much more dependent on social skills and technological competencies... Therefore, there is a need for rapid reform of the labor market to make it work better and pay special attention to ***skills-upgrade***. (Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-20, pp. 10-11).

The focus on the skills acquired in vocational education and training present in the Vocational Education and Training Strategy in the Context of Lifelong Learning 2013-20, is of exceptional importance. After all, this focus was due to the broader situation present during the last decade or two. Namely, on the one hand, there is high unemployment, technical progress and globalization, and on the other hand, the extensive restructuring of production processes, as well as the population aging. Such conditions have led to changes in the demand for skills.

Therefore, the Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-20 with an Action Plan (2013) contains a clear view that *skills and qualifications acquired within the framework of the education system should be reviewed* in order to be able to meet current and new needs, as there is a possibility of deep imbalances in the supply and demand for skills.[34] In this sense, it is emphasized that Macedonia should focus on continuous workforce empowerment by knowledge, skills and attitudes that do not have to be acquired exclusively through the formal education system.[35]

The Vocational Education and Training Strategy in the Context of Lifelong Learning 2013-20 points to the fact that, according to numerous analyses, the applied skills such as reading comprehension and mathematics, have greater weight at all educational levels than the basic knowledge. Although this knowledge is still the foundation of new workforce abilities to effectively perform their tasks in the workplace, employers are increasingly emphasizing that applied skills (foreign language skills, critical thinking and problem solving, oral and written communication, teamwork and collaboration, the ability to apply information technology, leadership, creativity and innovation, lifelong learning abilities, professionalism and work ethics, general ethics and social responsibility) are qualities that are required of future workers. Obviously, in this context, *green skills* should have a special importance.

However, the question arises whether vocational education is an attractive destination for young people. Unfortunately, the answer in the past was often negative. With the exception of medical, and economic and legal professions, the other professions are generally less attractive

[34] To overcome the disparity between educational supply and demand, the European Commission launched an initiative in 2008 entitled "New skills for new jobs". The aim of the initiative was to enable better anticipation of future skills needs and develop a better match between skills and labor market needs.

[35] Numerous studies confirm that employers in our country generally emphasize the need for knowledge of foreign languages (English, German, Italian), knowledge of basic computer applications, as well as advanced knowledge and skills acquired in the field of information technology, communication skills, etc. Also, the majority of employers believe that the job candidate and/or the employee should have a diploma for completed appropriate education. Consequently, the qualification based on an adequate certificate is prevailingly trusted by the business. The possibilities of applying mechanisms for valuing the skills acquired outside the formal system do not yet have a place in our environment.

to young people. This is especially significant for VET, i.e., for programs with a shorter duration (2 or 3 years). The low valuation of these qualifications on the labor market contributed to young people preferring to enroll in technical education with the intention of continuing their education. After all, a strong economy can make low qualifications attractive, but a weak economy negatively affects their attractiveness among young people (Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-20, p. 25). Truth to be told, in recent years there has been a certain shift away from this situation. Namely, "according to the State Statistical Office's statistics, secondary education students are more interested in vocational education programs compared to general education programs (high school education), which is an encouraging factor. More specifically, almost 60% of students are enrolled in vocational education compared to 40% of students enrolled in high school education." (Jovanovski A., p. 74).

The impression is that until some time ago, the employment processes in the Republic of North Macedonia started having slow upward changes in terms of demand for higher skills and higher education. According to the *2011/2012 Analysis of Labor Market Skill Needs*, prepared by the Employment Service Agency of the Republic of Macedonia,[36] at the beginning of the previous decade, the largest part of the demand for labor force according to the level of required knowledge (education) related to persons with completed secondary education (67.3%), mostly in manufacturing, trade, transport and construction. This was followed by people with completed primary education (15.7%), mostly in the processing industry, agriculture, hunting and forestry, and construction. The demand for persons with higher education was much lower (9.9%), mostly in the manufacturing industry, professional scientific and technical activities, trade, and financial and insurance activities.

Responsiveness to this situation has been translated into the *Law on National Qualifications Framework* (2013). Namely, in Article 17 of this Law, a special place is dedicated to the Ministry of Labor and Social Policy, which, among other things, is expected to establish and develop a system for obtaining information about *the current and future labor market needs and the competences required thereon,* as well as *to propose development of standards regarding both occupations and qualifications in line with the labor market needs*. In truth, this was previously stipulated by the *Law on Vocational Education and Training* (2006) where the Ministry of Labor and Social Policy was required to assess the needs for staff from vocational education and training through an analysis of the labor market and provide an opinion regarding the enrollment policy to the Council for Vocational Education and Training.

Two of the most important goals in the Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-20, are the following:

- Offer young people and adults more diverse and flexible learning opportunities in order to acquire the *skills* they would need for career development and which would encourage their entrepreneurial spirit; and

- Promote top quality and social inclusion; contribute to greater employability, mobility and job security; *improve both anticipation and management of changes in the labor market;* and encourage labor competitiveness.

The goals are associated with four priority areas, of which the most interesting for the purpose of this research is the second area relating to attractive vocational education and training. This is based on several detected weaknesses, such as: weaknesses in the curricula development process; weaknesses in relation to practical teaching; the need to introduce new courses; the need to introduce new profiles; and the necessity to strengthen the acquisition of skills on the part of students, with a special emphasis on *soft skills* (communication skills, teamwork, interpersonal skills, time management, etc.).

[36] This research was conducted for the needs of the Strategy for Vocational Education and Ttraining in the Context of Lifelong Learning 2013-2020, in order to refresh the information on the skills required for work and employment in the business sector. This analysis was based on a survey of a sample of employers and based on the results obtained, the Agency analyzed the labor market skills needs.

Certainly, in this context, there is room for adding green skills. A large part of the weaknesses identified in the Strategy has been resolved by the reforms of vocational and technical education (new curricula and programs have been developed; new module-based courses have been introduced; learning through work has been introduced as an opportunity for cooperation between vocational schools and companies while enabling students to realize practical training in real conditions; professional theory and practical teaching have been integrated in each vocational program; each program has been based on learning outcomes and assessment criteria, etc.).

No special elaboration is required on the fact that the system of vocational education and training should correspond to the economic, demographic and cultural environment. Thus, the workforce and skills development assessment should follow the logic of both local development and local economy (Local Economic Development - LED) in the context of country's economic development. The planning of educational profiles/qualifications and skills required in the future should start from local needs and development plans. (Strategy for Vocational Education and Training in the Context of Lifelong Learning 2013-20, p. 45). Certainly, in this context, green skills should also be included, given that environmental protection is a significant segment of LED. In fact, the environmental protection and sustainable development issue is an inevitable element of any strategy for local development of any local government.[37] In addition to this, the competences devolved to Municipal Councils and the Council of the City of Skopje by the *Law on Vocational Education and Training* (2006) should be underlined. Namely, within their competences in the area of LED, Municipal Councils shall: a) perform labor market needs analysis at the local level and communicate their needs considerations to both the Center and institutions for vocational education and training; b) submit proposals to both the Ministry and the Center regarding the needs for development of curricula and programs; and c) submit enrollment policy proposals to the Ministry of Education and Science regarding vocational education and training.

2.5.3. Adult education subsystem

It is known that the education system in our country includes formal and non-formal education, but also informal learning. Formal adult education is provided at state and private schools and universities, both full-time and part-time.[38]

A number of institutions and bodies are responsible for the adult education system. In addition to the Ministry of Education and Science, the Adult Education Center, the Adult Education Council, and the Ministry of Labor and Social Policy should be mentioned. Of course, this does not mean that the list is complete, because there are some other institutions that provide relevant services. They can be either state or private adult education institutions, centers for professional development, but also employers, social partners, citizens' associations or individual trainers.

Educational services for the engaged (adult) labor force are provided by: private and state specialized institutions (workers' universities, educational consultancies, training centers, foreign language centers, computer literacy centers, advisory centers, then trade unions, chambers and associations, employment agencies, professional bodies, non-governmental organizations, etc.).

One of the most important institutions is the Adult Education Center, whose mission is to create a functional adult education system that will be guided by the EU standards. Apart from the Center, the role of the Adult Education Council is also significant, as it provides proposals for adult education strategy development.

[37] According to: Manual on Certification of Cities and Municipalities with Favorable Business Environment in Southeast Europe - Edition III, National Alliance for Local Economic Development (NALED), Belgrade, 2017, translation.

[38] Adults can attend only regular primary education, while they can complete their secondary education by taking exams.

The most significant strategic document in this sphere is the *2005-2015 National Program for the Development of Education* (2006), within which the *Program for Adult Education in the Republic of Macedonia* was an important integral part. Based on these, the *Law on Adult Education* (2008) was adopted. The Law focuses on the organization and provision of adult education and the recognition of prior learning. The service providers accreditation procedure for the recognition of prior learning is assigned to the Adult Education Center, which since 2009, when it started its operations, has been responsible for ensuring the quality of education offered and monitoring of adult education supply. In this way, education for adults (workforce hired) was established as part of the educational system in Macedonia.[39]

According to the performance shown, it can be said that our adult education system lags behind the corresponding system at the EU level. Namely, before the beginning of the pandemic caused by the Covid-19 virus, i.e., in 2019, the participation of adults (aged 18 and older) in education was 8.9%, which is almost half of the rate recorded at the EU level in the same year (16.8%). Similarly, the share of the population aged 16-74 with digital skills (one of the targets set out in the European Pillar of Social Rights) was 32%, compared to the average of 56% in the EU countries. (National Employment Strategy 2021-2027, pp. 19-20)

From the previous analysis, it has become clear that a serious deficiency of the national subsystem for vocational education and training is the absence of a strategy for creating green skills in the secondary education curricula. As for the national accreditation and certification system, it foresees the existence of an applicable rulebook on curricula confirmation and tasks implementation by institutions competent for providing and organizing vocational training for adults. The procedure for approving such curricula and institutions takes place within a time interval of six to nine months.

When it comes to adult training, international experiences speak in favor of the fact that "training for greening of occupations and retraining of displaced workers is most often realized in the form of short courses." (ILO, 2018, p. 145) In this sense, from the more important trainings for certain occupations intended for adults, in which green skills are present, the following can be distinguished: the training for carpenters, the training for plasterers-fitters and the training for façade installers (exterior plasterers). Eight institutions have approvals to conduct technical skills training. A program that offers complete training based on green qualifications and skills is the solar energy and underfloor heating installation training within the program for electricians.

Considering the above, it should be noted that training in deficient occupations is implemented through active employment programs contained in the operational labor market employment plans and services, adopted by the Ministry of Labor and Social Policy on an annual basis, and implemented by the Employment Service Agency. In this context, it is very significant that "in the 2018 and 2019 Operational Plans, for the first time, the *measure for meeting the demand for occupations and trades, social services and qualifications leading to 'green jobs'* was introduced. This measure resulted from the green jobs working group in 2017, championed by the Go Green Association and the Swiss Contact Increasing Market Employability Programme. Allocation of funds to training and qualifications leading to green jobs can be considered a success, because (as highlighted - authors' note) for the first time within the Operational Plan, green jobs are funded and mentioned." (Jovanovski A., p. 76). The term used - *qualifications leading to green jobs*, refers very concretely to the fact that it is about *green skills* created for the labor market needs.[40]

Beyond the vocational education and training system, one-day or two-day seminars, weekly trainings or courses lasting 40 hours are offered over a period of a little more than 2.5 years. Such trainings are offered by relevant educational institutions or manufacturers of equipment and construction materials.

[39] Additional legislation relating to non-formal education includes the Law on Labor Relations, as well as a series of regulations (for example, the Rulebook on the content and form of documentation and records maintained by adult education facilities and institutions).

[40] The Operational Plan for 2018 provided that 400 people should be covered by this training, and in 2019 that number went up to 500 unemployed people.

2.5.4. Barriers to the process of creating green qualifications and green skills

Creating green qualifications and green skills is usually not a simple process. Namely, in the complex everyday life, obstacles often appear that either directly or indirectly discourage the opening of processes for the creation of such skills.

Obstacles can occur both on the demand side for such skills and on the supply side. Certainly, one must not forget the state and its institutions, which by their (in)adequate engagement can act as a disincentive. Companies facing the need for green skills in their business operations (for example, construction companies, manufacturers and suppliers of construction materials and technologies, etc.), as well as households, can be mentioned on the demand side. Institutions in the secondary vocational education subsystem can be specified on the supply side.

The inadequate setup and inappropriate organization of the relevant ***state*** institutions may be a serious obstacle to the process of creating green qualifications and green skills. This usually results from the *low institutional capacity* of state institutions.[41] For example, the limited human resources in individual ministries, centers and agencies do not speak in favor of the existence of sufficient capacity for individual strategies and action plans implementation, the realization of which would provide an adequate incentive for creating green skills in the educational system. This is compounded by the *lack of coordination between competent institutions* (ministries and agencies) and stakeholders, which could further delay or even suspend the implementation of strategic guidelines in various areas. Certainly, this obstacle can be overcome by closer cooperation between agencies regarding the design and implementation of strategic activities.

As for the ***demand*** for such skills, *the lack of information and knowledge about current global trends* is often an obstacle. In many cases, lack of awareness and reluctance to change can hinder progress and infiltration of solutions for greater success. Companies are not always in a position to make successful decisions involving complex and uncertain outcomes. After all, when faced with uncertainty and risk, the business sector tends to make simple decisions in order to meet its minimum needs, instead of trying to reach an optimal solution.

The lack of information about modern technologies and their impact on the rate of return on investment can be a very serious obstacle. Namely, combined with the risk aversion associated with early adoption of new technologies and techniques, this lack of information can pressure investors and banks to continue supporting old technologies, even when they are clearly not the most efficient or they do not provide the best return on investment.

In general, market liberalization brings with it positive signals for the creation of green qualifications and skills (for example, as previously highlighted, through its positive impact on energy efficiency). However, we still do not have a sufficient number of specialized economic entities through which these signals will be transferred to the education system. In the case of energy efficiency, it is about the promotion of professional energy audits and energy services in order to provide access to competitive counseling on how to improve energy efficiency. Consumer awareness campaigns, energy efficiency training programs for professionals and adequate branding of household appliances can help remove this barrier.

Economic crises and recessions have a negative impact on the emergence of new green skills because they lead to a change in the priorities of companies, which are often forced to

[41] As a matter of fact, there are numerous examples where the state intends to establish institutions that can contribute to the creation of green skills. Such is the case with the possible establishment of an Energy Efficiency Fund. Namely, the Law on Energy Efficiency (Official Gazette of the RM, No. 32/2020) in its Art. 30 envisages to establish this type of fund as a separate institution with whose support it should be enabled to achieve energy efficiency goals and support energy efficiency policies. The Law stipulates that the very establishment, competences, operation and methods of financing of this Fund shall be governed by a separate law.

rationalize their costs. In this context, the current economic crisis is reflected in cost cutting and reduced investments in the professional development of economic entities' staff. This applies to companies of all sizes, including large ones, but it is no surprise that SMEs are most affected.

Of course, this was preceded by a situation in which many of our companies did not have *comprehensive HR policies.* Most often, this results in a lack of professional training, but it is also reflected in the stability of workplaces, as well as in the possibilities for professional advancement of skilled workers. However, if one considers the labor force mobility and its openness to the possibilities offered by the labor market in the European Union, then the restraint on the part of a large number of companies and employers in our country becomes understandable in view of significant investments in continuous professional training and qualifications for their employees. Thus, another obstacle arises, having a strong impact on the creation of new modern qualifications and skills. Namely, *the migration of the labor force to other countries, especially to neighboring countries and the EU*, represents an obvious phenomenon of the "export" of qualifications outside the country. The reasons for such migrations should be sought in the level of wages differences, but also in the working and living conditions between our country and migrants' destination country (most often Germany, Italy, but also Croatia, Montenegro, etc.), as well as in the EU Member States' policies to attract qualified labor force.

Box 3: Policy of attracting skilled labor in Germany

At the initiative of the Federal Ministry of Labor and Ministry of Economy, and in coordination with the Employment Service Agency, ten years ago, Germany launched two internet platforms with the aim of informing and attracting qualified labor. This was a reflection of the situation at the beginning of the 21st century, when Germany, which is considered the "locomotive" of the EU economy, gradually started facing a serious labor shortage.

One of the platforms took advantage of a website listing skilled workers outside Germany (www.make-it-in-germany.com) promoting the quality of life in Germany and focusing on making it easier for foreigners to find jobs. Thus, in conditions of a rapid process of population aging, but also in the presence of a very low unemployment rate (6.7 percent in 2012), the Federal Government of Germany gave a strong priority to the recruitment of qualified labor, considering that "in 2025, as a result of demographic processes, Germany will feel a shortage of about 6 million working people" (statement of the former German Minister of Labor, Ursula von der Leyen).

When it comes to the demand side, one should take into account the motivation of the hired workforce to attend additional trainings where they will acquire new (green) skills. The impression is that the existing workforce is usually not interested in participating in vocational training. There are numerous reasons for this, but most of them are related to job insecurity. This is compounded by the low general education level. In addition, seasonal workers are usually not interested in participating in training, even when it comes to field training. Certainly, *the age structure of the workforce* also has its influence. More specifically, older workers usually do not show interest in vocational training.

Finally, *gray economy* also appears as a demand-side obstacle that can disincentivize the emergence of green skills. Namely, the workforce engaged in activities covered by the informal economy, usually cannot qualify for access to formal training organized and offered by the relevant state institutions.

Obstacles that may appear on the ***supply side*** of new green skills basically relate to the subsystem of vocational education and training. The national education system in certain cases shows the need for institutions and programs related to additional training of teachers of special skills. In this regard, the fact that there is a lack of incentives for further qualification of trainers should not be overlooked.

Training needs should be subject to forecasting within the respective institutions, which should result from intensive cooperation between interested parties. This primarily refers to cooperation between training and education institutions, professional chambers and associations, non-governmental organizations and the Government.

Usually, the state vocational education system is conservative and any changes are implemented relatively slowly therein, compared to the speed at which technological development is taking place. Hence, the introduction of new elements into curricula can be relatively slow. Therefore, program updates should be a regular practice, including the necessary coordination with relevant participants. New curricula reflecting the latest skills should also be reviewed constantly and anew.

Cooperation with the business sector and business actors can help a lot in this direction. The growing number of examples of dual education, which are the result of the cooperation between the secondary vocational education subsystem and the chambers of commerce, represent a confirmation that this is a very important practice. In this sense, efforts are required for intensive knowledge exchange, interest coordination and specific partnership projects that would lead to better preparation of the persons being trained to enter the labor market.

The drawback of the national education system to anticipate new skills can also be a serious obstacle to creating green skills. The implementation of modern global trends in the system of secondary vocational education can be expected to result from the cooperation between all participants, the creation of adequate organizational and financial prerequisites, but also through the equal distribution of responsibilities. This cooperation can be expected to increase the attractiveness of vocational education and strengthen the linkage between education and work.

2.5.5. Secondary vocational education and acquisition of "green" skills in the Republic of North Macedonia

To research "green" skills and their potential in secondary vocational education in the Republic of North Macedonia, a combined methodology was applied in order to come up with relevant findings from different perspectives.[42] The use of a combined research methodology made it possible to observe the current status of integration of contents by which students would acquire "green" skills in secondary vocational education. This methodological approach implies the application of both qualitative and quantitative research methods and techniques, which allowed for:

- Secondary data analysis (comprehensive review and analysis of existing documents, regulations and programs, and comparative analysis thereof).
- Primary data assessment and analysis (semi-structured interviews, unstructured observation and online surveys).

In continuation follow the secondary and primary data analyses, clarifications of the methodological approach to the research methods and techniques used, and the results obtained by their implementation.

2.5.5.1 Analysis of the current situation regarding the acquisition of "green" skills in secondary vocational education in the Republic of North Macedonia – secondary data

In the Republic of North Macedonia, vocational education and training is part of the education system that ensures individual development of the person through the acquisition of competencies, knowledge and skills required to get involved in the labor market or continue with education.[43]

Secondary vocational education in the Republic of North Macedonia prepares students, i.e., future active citizens who will be able to continue their education, and it also trains staff with professional competencies that must meet the demands of the modern, competitive and flexible labor market. It is based on principles such as inclusiveness, quality, relevance, employability, entrepreneurship etc. Therefore, it is said that vocational education can respond to the complex demands coming from all stakeholders, including society, the economy, parents and students.

Through vocational education and training, students fulfill their educational needs; they acquire skills and relevant qualifications required to be included in various areas of the labor market; they prepare for initiative, creativity and quick response to changes; they get ready for lifelong learning; they develop an entrepreneurial spirit, i.e., they are encouraged to take part in further education, but also to start their own business.

[42] In the professional terminology for vocational education in the Republic of North Macedonia, a skill does not have an adjective, but it means a developed ability to perform certain work tasks.

43 Law on Vocational Education and Training, Official Gazette of the R. N. Macedonia, No. 71/2006; 117/2008... 275/2019.

Vocational education also contains an option for the so-called open path or horizontal and vertical mobility. Horizontal mobility means that the student, in the course of their education, can move from one type of education to another, from one to another educational profile/qualification, even occupation/department, certainly under certain conditions. Vertical mobility means that upon completion of any lower-level educational profile/qualification, there is a possibility to continue with education for a higher-level qualification under certain conditions and in the course of education.

This type of education takes place in secondary schools organized as either public or private schools. State secondary vocational schools are established by the Government and they are under the jurisdiction of local authorities, while a private school may be established by either a domestic or foreign private entity or natural person pursuant to the Law on Secondary Education.[44] The network of public secondary schools is determined by the Government of the Republic of North Macedonia on the proposal of municipalities and the City of Skopje.

27 secondary schools in the Republic of North Macedonia provide both high-school and vocational education, while 56 secondary schools provide only vocational education. Accordingly, vocational education is present in 83 out of a total of 109 public secondary schools.[45] Full-time and part-time students who have completed primary education enroll in vocational education that can be of three- or four-year duration, as well as specialist education.

Persons with no completed primary education can also be included in vocational training for up to two years, but the program prescribed for primary education shall be completed in parallel with the vocational training. After completing the four-year vocational education, starting from the 2006/2007 school year, students take the state matura or final exam. After completing the three-year vocational education, students take the final exam. Students taking the state matura acquire the right to educate in adequate university studies.

All educational profiles/qualifications in vocational education and training, starting from level II to level V B of the National Qualifications Framework, are distributed in 16 (sixteen) sectors of vocational education qualifications, including:[46]

1. Geology, Mining and Metallurgy
2. Construction and Geodesy (Surveying)
3. Printing Technology/Industry
4. Economy, Law and Commerce
5. Electrical Engineering
6. Health and Social Protection
7. Agriculture, Fisheries and Veterinary Medicine
8. Personal Services
9. Mechanical Engineering

[44] Law on Secondary Education, Official Gazette of the R. Macedonia, No. 44/1995, 24/1996... 229/2020.

[45] Competition for enrollment of students in public secondary schools for the 2022/2023 school year in the Republic of North Macedonia, MES, March 2022, https://mon.gov.mk/stored/document/konkurs%202022-2023%20mk_1.pdf, accessed on 2 May 2022.

[46] "Guide through the qualifications in vocational education", prepared by the working team of the Center for Vocational Education and Training, with the support of the Project "Education for Employment in North Macedonia" (E4E@mk), published by the Project Education for Employment in North Macedonia (E4E@mk), https://drive.google.com/file/d/1ejoTytjSPx52yiWqoM8BA_yALGTXBK4p/view, accessed on 28 April 2022.

10. Traffic, Transport and Storage
11. Textiles, Leather and Similar Products
12. Hospitality and Tourism
13. Chemistry and Technology
14. Forestry and Wood Processing
15. Sports and Recreation
16. Art.

In its Program document that defines occupations and educational profiles, the Bureau for Development of Education identified 14 occupations and 93 educational profiles for which the Center for Vocational Education and Training (CVET) is responsible. These occupations/sectors are as follows:[47]

1. Geological and mining and metallurgical occupation/department
2. Construction and surveying occupation/department
3. Printing occupation/department
4. Economic and legal and commercial occupation/department
5. Electrical engineering occupation/department
6. Healthcare occupation/department
7. Agricultural and veterinary occupation/department
8. Personal Services
9. Mechanical engineering occupation/department
10. Traffic engineering occupation/department
11. Textiles and leather occupation/department
12. Hospitality and tourism occupation/department
13. Chemical and technological occupation/department
14. Forestry and wood processing occupation/department

This type of clustering into fewer profiles/qualifications or occupations/departments is aimed at creating a broader educational base that would enable greater qualification flexibility and adaptability. In case of any technological, economic and structural changes, the workforce would easily adapt to the labor market needs, by minor additional training and retraining.

Vocational education and training is implemented through programs of the following types and levels:[48]

[47] https://www.bro.gov.mk/%d1%81%d1%80%d0%b5%d0%b4%d0%bd%d0%be%d1%81%d1%82%d1%80%d1%83%d1%87%d0%bd%d0%be%d0%be%d0%b1%d1%80%d0%b0%d0%b7%d0%be%d0%b2%d0%b0%d0%bd%d0%b8%d0%b5/, accessed on 2 May 2022.

[48] "Guide through the qualifications in vocational education", ibid., p. 10.

- *Vocational training* - lasts for one to two years and students acquire a vocational training certificate or level II (second level) of qualifications, in accordance with the National Qualifications Framework (NQF). Students can continue their education in the respective educational profile/qualification for occupational vocational education (of three years) if they pass entry exams or they can enter the labor market.

- *Vocational education for occupations* - lasts for three years, students acquire level III (third level) of qualifications under the NQF. The student has two possibilities, either to join the labor market or to continue their education in the fourth year of technical education. If they pass some additional exams, while having at least three years of relevant work experience, they can join post-secondary education.

- *Technical education* - lasts for four years and prepares students for the labor market and/or for continuing their education. Students who have completed this type of education by passing the state matura (graduation) exam, obtain a State Matriculation Diploma that gives them the opportunity to continue their education at all higher education institutions. Students who have completed their education by passing the final exam, acquire a Final Exam Diploma that allows them to actively participate in the labor market. In addition, the student can continue their education in post-secondary education. Students acquire level IV (fourth level) of qualifications, in accordance with the NQF.

Curricula and programs for educational activities in secondary vocational education regulate the goals, teaching areas, content and educational standards, including the profile of the teacher performing the instruction. Programs are developed according to a program template adopted by the Minister at the proposal of the Bureau for Development of Education. The template also determines the flexibility in the implementation of teaching areas and contents.[49]

Ferial practice and learning through work with an employer are special forms of instruction through which the student acquires practical skills in real conditions, at the employer's company. On the one hand, this gives the student the opportunity to gain some "work experience" and be trained in a real context even during their education. On the other hand, employers learn about the potential of future employees who have been trained to carry out work tasks with them and have the opportunity to select from already prepared workers.

Further, if the results of the 2020 Survey on Labor Market Skills Needs in the Republic of North Macedonia are viewed, it will be observed that in almost all activities there is a need for workers with secondary vocational education, where in real estate-related activities such are 92% of the total expected employments; in transport and storage 89% of employments; in the accommodation facilities activity and food service activities 74% of employments, while in the construction activity 71% of employments were expected to be persons with secondary education. With regards to occupations, priority new hires were expected to be: mechanical engineering technician, administrator, electrician, nurse, sales clerk, installation and equipment electrician, textile technician, medical nurse, pharmaceutical technician, pharmacological technician, construction technician, mining technician, electrical engineering technician, chemical technician-operator, technologist technician, printing technician, welder technician, shipping technician, system operator, computer technician, electrical energy technician, seamstress, textile seamstress, salesperson, waiter, cashier, welder, chef, locksmith, construction worker, storekeeper, baker, shoemaker, tailor, weaver, bricklayer, upholsterer, construction machinery operator, furniture fitter, confectioner, tinsmith, handyman, hewer, rebar worker.[50]

[49] https://www.bro.gov.mk/%d1%81%d1%80%d0%b5%d0%b4%d0%bd%d0%be%d1%81%d1%82%d1%80%d1%83%d1%87%d0%bd%d0%be%d0%be%d0%b1%d1%80%d0%b0%d0%b7%d0%be%d0%b2%d0%b0%d0%bd%d0%b8%d0%b5/, accessed on 2 May 2022.

[50] 2020 Survey on the Labor Market Skills Needs in the Republic of North Macedonia, Results of the conducted survey, p. 3-5. https://av.gov.mk/content/Dokumenti/Anketa%20za%20potreba%20od%20vestini%202020%20w.pdf, accessed on 10 May 2022.

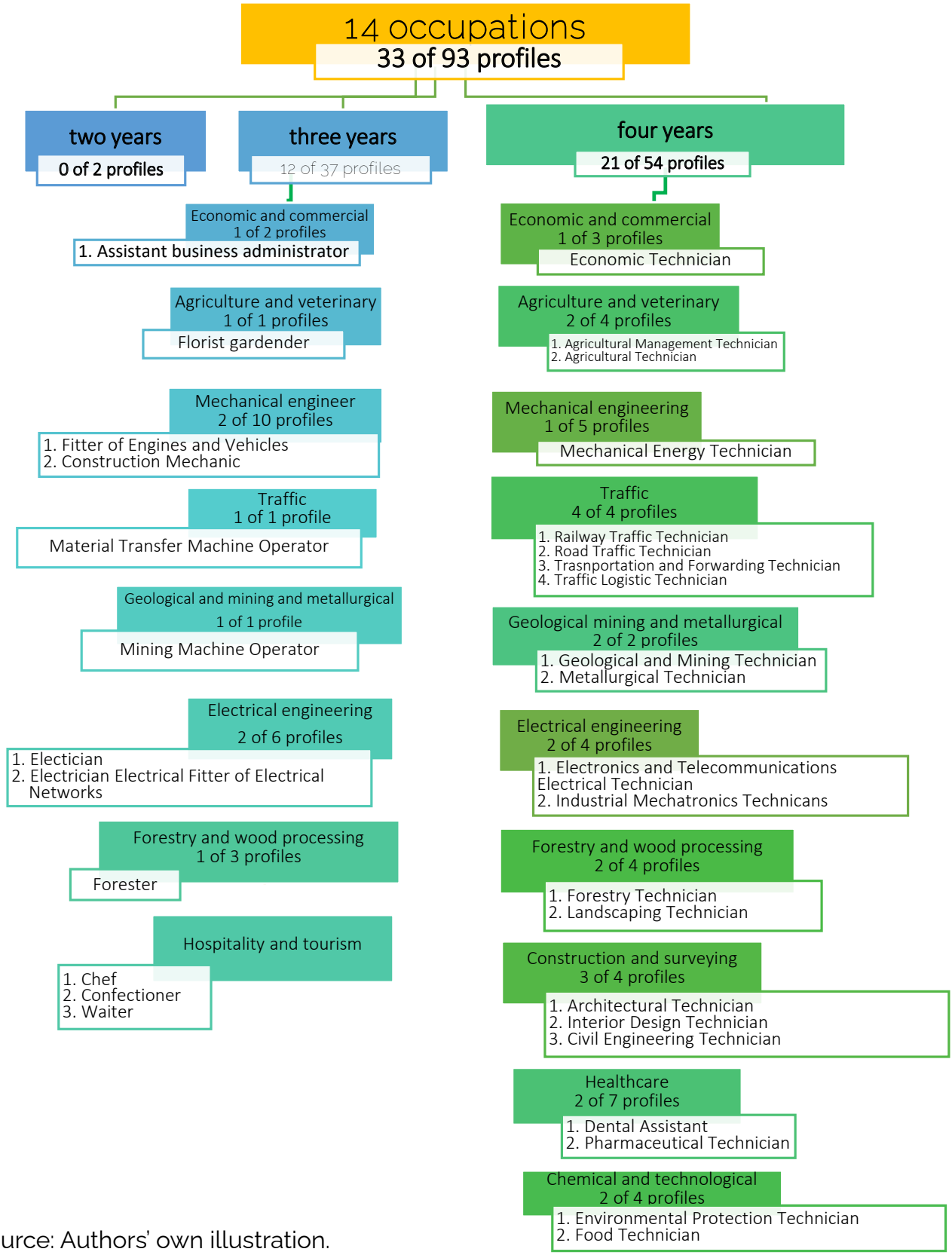
In order to get a general overview of the current situation and to identify the possibilities of integrating "green" skills in the educational process of secondary vocational education, an analysis was performed of the qualifications acquired by students after completing secondary vocational education in the Republic of North Macedonia. The aim of this analysis was to establish whether, within a specific educational profile/qualification, students also acquire competences for "green" skills, so in this sense, the term "qualifications including 'green' skill competences" is used in the analysis. As a source of data for developing the analysis, the first edition of the already cited "Guide through the qualifications in vocational education"[51] was used, which is of an informative nature, but is comprehensive and contains specific information and details about the educational profiles/qualifications of all 14 occupations/departments for which the Center for Vocational Education and Training (CVET) is responsible. These vocations/departments are elaborated individually, and within each occupation/department all educational profiles/qualifications are presented in order to get a real picture of the current situation in the vocational education of the Republic of North Macedonia.

The analysis was done using the research technique of key word identification while examining the qualifications of educational profiles/qualifications in each occupation/department in the two-year, three-year and four-year vocational education, covered in the "Guide...". The keywords used include: Green, Ecology, Ecological, Protection of the environment (living/natural), Sustainable development/Sustainability, Circular (economy), Energy (efficiency), Social responsibility, Waste/Garbage, Pollution/Polluter/Polluting, Ethics, Code (of conduct), Recycle/Recycling, Purify/Purification, Energy sources (renewable, non-renewable, alternative), Healthy lifestyle, Selection, Natural resources, Energy saving, Organic farming, Good agricultural practice, Environmental impact, Climate change, Biological conservation measures, Biomass, Forest crop protection, Biodiversity, Global warming, Greenhouse gases, as well as related acronyms and synonyms.

As a general conclusion from the qualifications analysis in the educational profiles/qualifications of occupations/departments in the two-year, three-year and four-year vocational education, it can be said that some of the students acquire competences related to sustainability and environmental protection ("green" skills) in several departments or occupations, but not in all educational profiles/qualifications belonging to one occupation/department. (Figure 2).

[51] "Guide through the qualifications in vocational education", prepared by the working team of the Center for Vocational Education and Training, with the support of the Project "Education for Employment in North Macedonia" (E4E@mk), published by the Project Education for Employment in North Macedonia (E4E@мк). https://drive.google.com/file/d/1ejoTytjSPx52yiWqoM8BA_yALGTXBK4p/view, accessed on 10 May 2022.

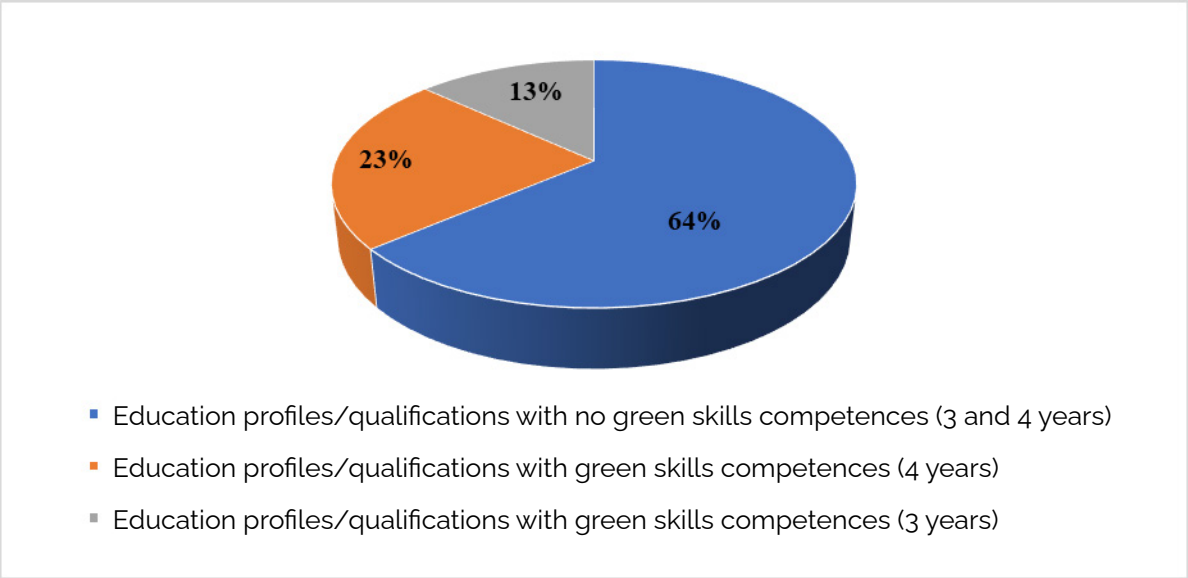
Figure 2: Share of "green" skill competences in occupations/departments and educational profiles/qualifications in two-year, three-year and four-year secondary vocational education in the Republic of North Macedonia



Source: Authors' own illustration.

As can be seen from Figure 2, out of a total of 93 educational profiles/qualifications in 14 occupations/departments (for two-, three- and four-year education), qualifications with "green" skill competences are acquired in 33 educational profiles/qualifications, only in three-year education (12 educational profiles) and four-year educational programs (21 educational profiles).

Chart 1: Share structure of qualifications that include "green" skill competences in the educational profiles/qualifications of secondary vocational education

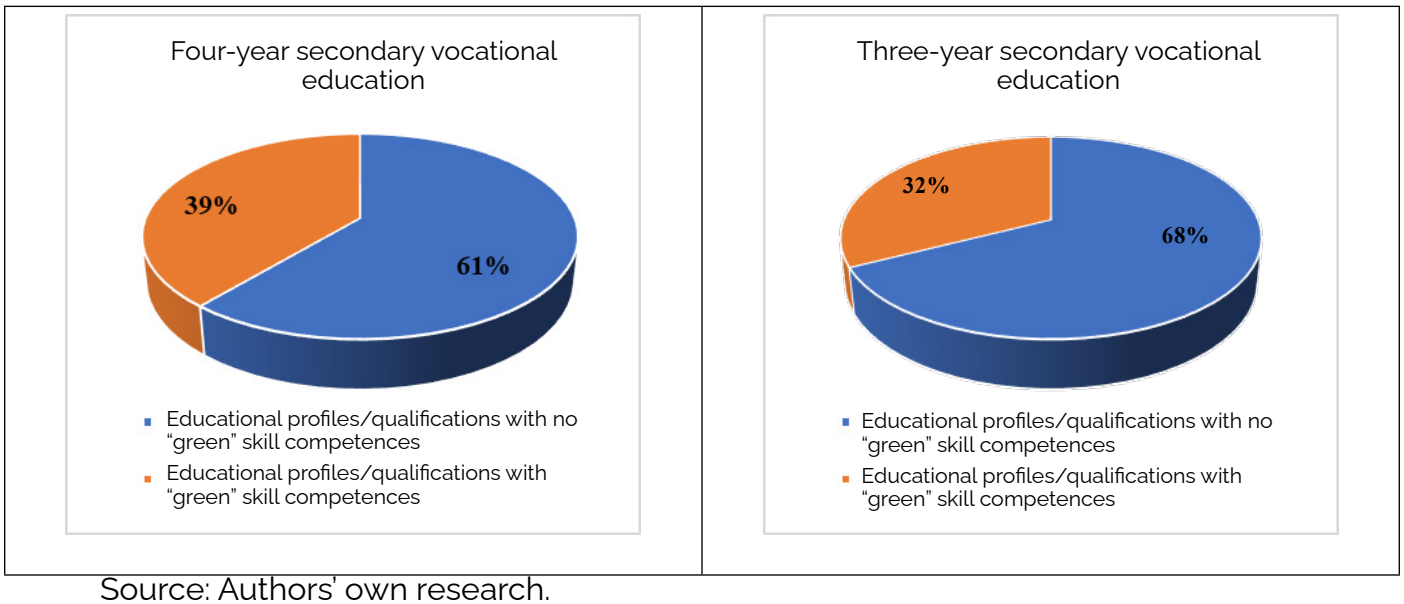


Source: Authors' own research.

As can be seen in Chart 1, out of the total of 93 educational profiles/qualifications analyzed, in 64% thereof, students do not acquire "green" skill competences. It is about a total of 60 educational profiles/qualifications that do not acquire "green" skill competences, of which 2 educational profiles/qualifications are from the two-year, 25 educational profiles/qualifications are from the three-year and 33 educational profiles/qualifications are from the four-year secondary vocational education. Out of the total of 54 four-year educational profiles/qualifications analyzed, students from 21 educational profiles/qualifications or 23%, acquire "green" skill competences. In secondary vocational education with a three-year duration, out of the total of 37 educational profiles/qualifications analyzed, students from 12 educational profiles/qualifications or 13%, acquire "green" skill competences.

The situation is similar if analyzed by individual levels of education. (Chart 2)

Chart 2: Share structure of qualifications that include "green" skill competences in the educational profiles/qualifications of three and four-year secondary vocational education



Source: Authors' own research.

Analyzed by level of education, the above chart shows that in the four-year secondary vocational education, 39% of educational profiles/qualifications are acquired with "green" skill competences, while in the three-year education, the figure is 32%. The situation presented in Charts 1 and 2 leads to the conclusion that in the secondary vocational education of the Republic of North Macedonia, the number of educational profiles/qualifications acquiring qualifications that include competences for sustainability and environmental protection skills ("green" skills) is higher in the four-year secondary vocational education.

In the three-year vocational education, students acquire knowledge and skills for sustainability and environmental protection or "green" skill competences in only 8 occupations/ departments, as follows:

- Economic and legal and commercial occupation (1 educational profile/qualification: Assistant Business Administrator, out of a total of 2 educational profiles/qualifications);
- Agricultural and veterinary occupation (1 profile/qualification: Florist Gardener, out of a total of 1 educational profile/qualification);
- Mechanical engineering occupation (2 profiles: Engine and Motor Vehicle Fitter and Construction Mechanic, out of a total of 10 educational profiles/qualifications);
- Traffic occupation (1 profile/qualification: Material Transfer Machine Operator, out of a total of 1 educational profile/qualification);
- Geological and mining and metallurgical occupation (1 profile/qualification: Mining Machine Operator, out of a total of 1 educational profile/qualification)
- Electrical engineering occupation (2 profiles: Electrician and Electrician, Electrical Fitter of Electrical Networks, out of a total of 6 educational profiles/qualifications);

- Hospitality and tourism occupation (3 educational profiles/qualifications: Chef, Confectioner and Waiter, out of a total of 3 educational profiles/qualifications);

- Forestry and wood processing occupation (1 profile/qualification: Forester, out of a total of 3 educational profiles/qualifications).

In the four-year vocational education, knowledge and skills for sustainability and environmental protection or "green" skill competences, are acquired in 10 occupations/departments, including:

- Economic and legal and commercial occupation (1 profile/qualification: Economic Technician, out of a total of 3 educational profiles/qualifications);

- Agricultural and veterinary occupation (2 educational profiles/qualifications: Agricultural Management Technician and Agricultural Technician, out of a total of 4 educational profiles/qualifications);

- Mechanical engineering occupation (1 profile/qualification: Mechanical Energy Technician, out of a total of 5 educational profiles/qualifications);

- Traffic occupation (4 educational profiles/qualifications: Railway Traffic Technician, Road Traffic Technician, Transportation and Forwarding Technician and Traffic Logistics Technician, out of a total of 4 educational profiles/qualifications);

- Geological mining and metallurgical occupation (2 educational profiles/qualifications: Geological and Mining Technician, and Metallurgical Technician, out of a total of 2 educational profiles/qualifications);

- Electrical engineering occupation (2 educational profiles/qualifications: Electronics and Telecommunications Electrical Technician, and Industrial Mechatronics Technician, out of a total of 4 educational profiles/qualifications);

- Forestry and wood processing occupation (2 educational profiles/qualifications: Forestry Technician and Landscaping Technician, out of a total of 4 educational profiles/qualifications);

- Healthcare occupation (2 educational profiles/qualifications: Dental Assistant and Pharmaceutical Technician, out of a total of 7 educational profiles/qualifications);

- Construction and surveying occupation (3 educational profiles/qualifications: Architectural Technician, Interior Design Technician and Civil Engineering Technician, out of a total of 4 educational profiles/qualifications)

- Chemical and technological occupation (2 educational profiles/qualifications: Environmental Protection Technician and Food Technician, out of a total of 4 educational profiles/qualifications).

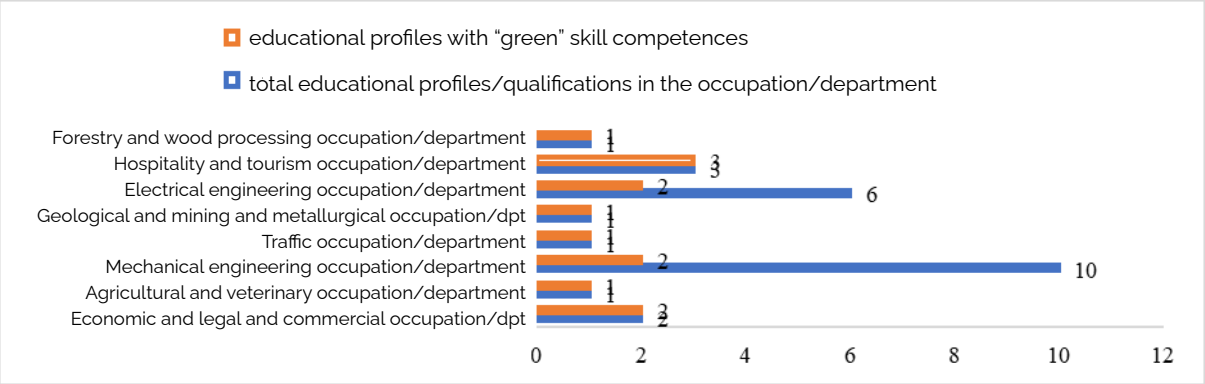
According to the qualifications by occupations/departments and educational profiles/qualifications listed in the Guide, in 3 occupations/departments and 14 educational profiles/qualifications, students do not acquire qualifications with competences covering skills for "green" economy, sustainability and environmental protection, such as the following:

- Printer occupation with 4 educational profiles/qualifications, of which 2 educational profiles/qualifications in three-year and 2 educational profiles/qualifications in four-year vocational education.

- Personal Services with 4 educational profiles/qualifications, of which 2 educational profiles/qualifications in three-year and 2 educational profiles/qualifications in four-year vocational education.
- Textile and leather occupation with 6 educational profiles/qualifications, of which 1 educational profile/qualification in three-year and 5 educational profiles/qualifications in four-year vocational education.

Chart 3 shows the number of educational profiles/qualifications that acquire qualifications including "green" skill competences within one occupation/department in the three-year vocational education.

Chart 3: Number of educational profiles/qualifications, by vocations/departments, that acquire "green" skill competences in the three-year vocational education

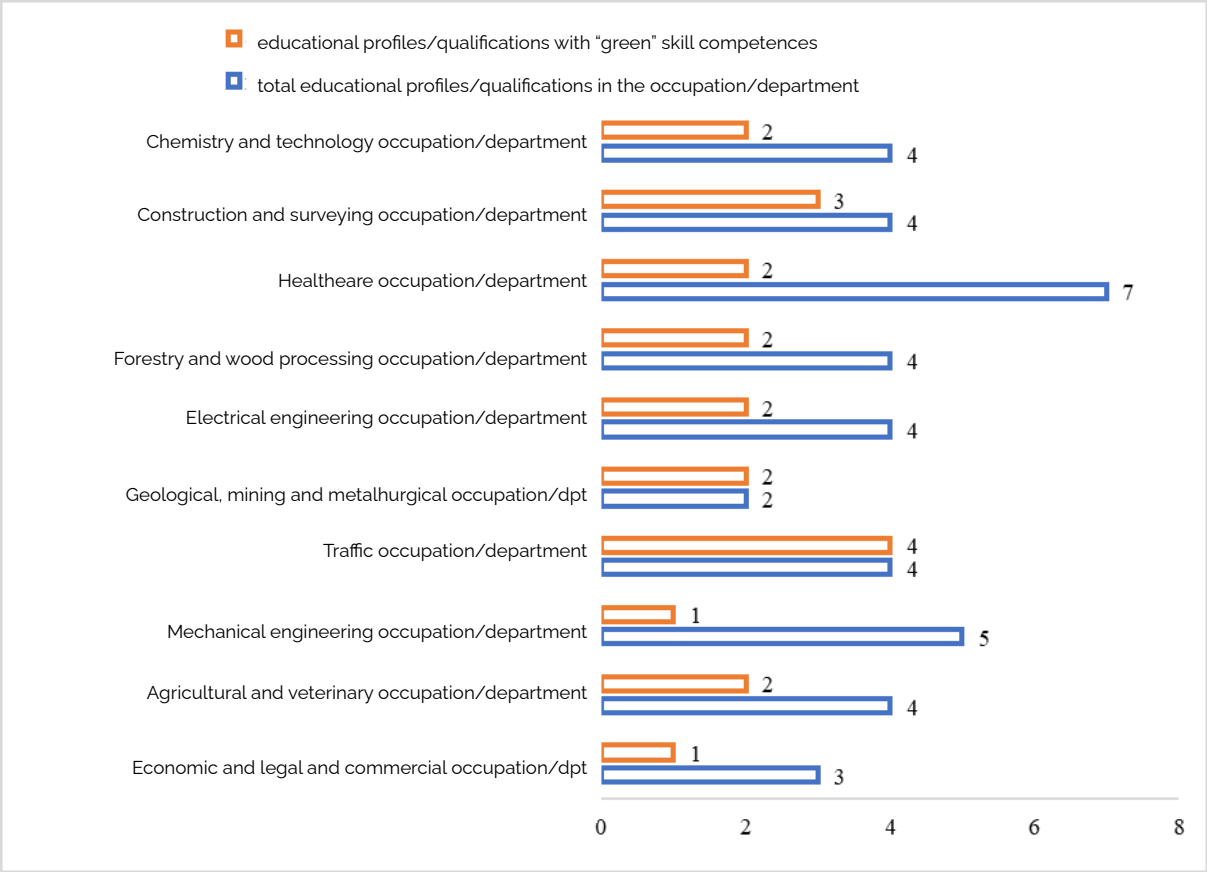


Source: Authors' own research.

It can be concluded that in 6 three-year occupations/departments (Economic and legal and commercial; Agricultural and veterinary; Traffic; Geological and mining and metallurgical; Hospitality and tourism; and Forestry and wood processing) in all educational profiles/qualifications offered (100%), students acquire qualifications with "green" skill competences. The Mechanical engineering occupation/department includes the fewest educational profiles/qualifications with "green" skill competences, or 20% (only 2 educational profiles/qualifications out of 10 offered).

Unlike the above, in the four-year vocational education, 100% share of qualifications with "green" skill competences can be found only in the educational profiles/qualifications of 2 occupations/departments, namely: Geological and mining and metallurgical occupation and Traffic occupation (Chart 4). Here, a special mention should be made of the educational profile/qualification of Environmental Technician within the Chemistry and technology occupation/department, where the main vocational qualification is completely "green".

Chart 4: Number of educational profiles/qualifications, by occupations/departments, that acquire "green" skill competences in the four-year vocational education



Source: Authors' own research.

In the other 8 occupations/departments of four-year vocational education, the share of qualifications with "green" skill competences in the educational profiles/qualifications is different, where the lowest share is seen in the Mechanical engineering and Healthcare occupations/departments (below 30%).

The findings of the secondary data analysis in the "Guide through the qualifications in vocational education" indicate that the concept of sustainable development and environmental protection in our country is integrated in some occupations/departments, having a greater share in four-year secondary vocational education, and being completely left out in two-year vocational education.

In order to identify where the listed qualifications with "green" skill competences originate from, with the help of the keyword search research technique, an in-depth analysis of the contents of secondary vocational education modularly designed curricula was carried out. Subject of this analysis was the presence of teaching contents and activities related to the sustainability and environment protection concept in the curricula of vocational subject areas, as well as how much such contents are incorporated in the curricula offered. The aim of this analysis was to determine the level of "greenness" both of individual subject curricula and each of the educational profiles/qualifications analyzed.

The biggest advantage of the keyword search research technique is that it significantly shortens the time required to review the necessary documents. However, its biggest limitation is that there is a danger of missing key information if the document does not contain the selected keywords. In addition, there is a risk that the keyword will not be identified if there are technical and/or typographical errors in the document.

Provided the time limit for this research and the number of subject curricula, the key word in-depth analysis was done on a representative sample. The "Guide through the qualifications in vocational education" was used as a basis to form the sample, which, although informative in nature, is still comprehensive and enables representativeness of all educational profiles/competences from all occupations/departments. The analysis included curricula for a total of 18 educational profiles/qualifications, or one profile/qualification from each occupation/department, where during the analysis of "The Guide...", qualifications including "green" skill competences were identified. In occupations/departments with more than one educational profile/qualification with "green" skill competences identified, the first profile/qualification on the list was taken most frequently.

The in-depth analysis of each vocational course syllabus within the educational profiles/qualifications selected, included an analysis of both the content of the course syllabus general components (including curriculum goals and objectives, curriculum modular units, material and technical conditions, literature and other sources) and the content of the modular units' components (such as learning outcomes, content and concepts, activities and assessment methods and criteria). They were evaluated based on different criteria as follows:

I. Identification of key words, i.e., both general words (terms) usually placed in the context of "green" economy, sustainable development, environmental protection and "green" skills, and specific words (terms) stemming from the specifics of the occupations analyzed. As keywords were used the following: Green, Ecology, Ecological, Protection of the environment (living/natural), Sustainable development/sustainability, Circular (economy), Energy (efficiency), Social responsibility, Waste/garbage, Pollution/Polluter/Polluting, Ethics, Code (of conduct), Recycle/Recycling, Purify/Purification, Energy sources (renewable, non-renewable, alterative), Healthy lifestyle, Selection, Natural resources, Energy saving, Organic farming, Good agricultural practices, Environmental impact, Climate change, Biological conservation measures, Biomass, Forest crop protection, Biodiversity, Global warming, Greenhouse gases, as well as related acronyms and synonyms.

II. Determination of the level of integration of contents on "green" economy, sustainability and the environment on a scale from 1 (low) to 5 (strong) integration, in terms of the key words' presence in the general components of the curriculum (curriculum goals and objectives, modular units, material and technical and spatial conditions, literature and other sources), but also in terms of the frequency and variety of keywords and the relevance of contents provided in the modular unit components (learning outcomes, contents and concepts, activities and methods, assessment criteria)[52], that is:

- 1 (low) - keywords identified in contents and concepts, including some other mandatory component; a small number of general keywords. As an exception, in the subject areas of Learning through Work with an Employer and Practical Instruction, the content of keywords in the activities and methods component is also taken into account;
- 2 (initial) - keywords identified in a goal or objective, contents and concepts and in some other mandatory component; a small number of general keywords;
- 3 (medium) - keywords identified in a goal or objective, modular unit, contents and concepts and in some other mandatory component; a larger number of general and specific keywords;
- 4 (good) - keywords identified in a goal or objective, modular unit, learning outcomes, contents and concepts, activities and methods, assessment criteria, and in some other

[52] The mandatory components including Material and technical and spatial conditions, and Literature and other sources, are not taken as key criteria for determining the level of integration of contents on green skills, sustainability and environment, because they contain general information.

mandatory component; a small number of diverse keywords or a larger number of general keywords;

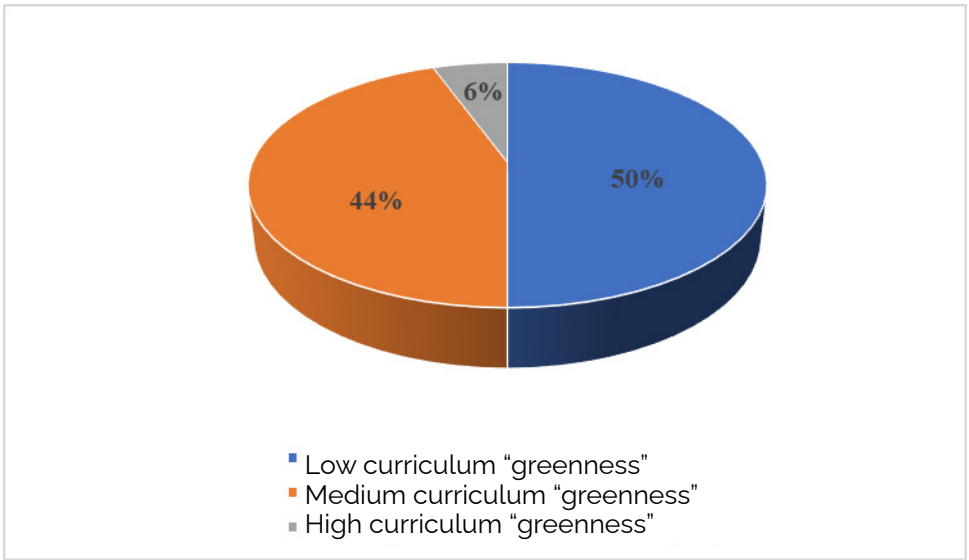
- 5 (strong) - keywords identified in a goal or objective, modular unit, learning outcomes, contents and concepts, activities and methods, assessment criteria and in some other mandatory component; a greater number of diverse keywords.

III. Analysis of educational profiles' "greenness" level, including:

- *Low "greenness"* - there is integration of content on "green" economy, sustainability and environmental protection in less than 30% of the total number of vocational courses provided for the educational profile,
- *Medium "greenness"* - there is integration of content on "green" economy, sustainability and environmental protection in 30-60% of the total number of vocational courses provided for the educational profile, and
- *High "greenness"* - more than 60% of the total number of vocational courses provided for the educational profile have integration of content on "green" economy, sustainability and environmental protection.

As previously stated, the sample for determining the level of "greenness" of educational profiles/qualifications was made up of 18 different occupations/departments and consisted of 18 different educational profiles/qualifications, of which 8 educational profiles/qualifications with three-year vocational education and 10 educational profiles/qualifications with four-year vocational education. The "greenness" level of the 18 curricula for 18 educational profiles/qualifications analyzed is shown on Chart 5.

Chart 5: Structure by level of "greenness" of vocational curricula analyzed for 18 educational profiles/qualifications (8 three-year and 10 four-year ones)



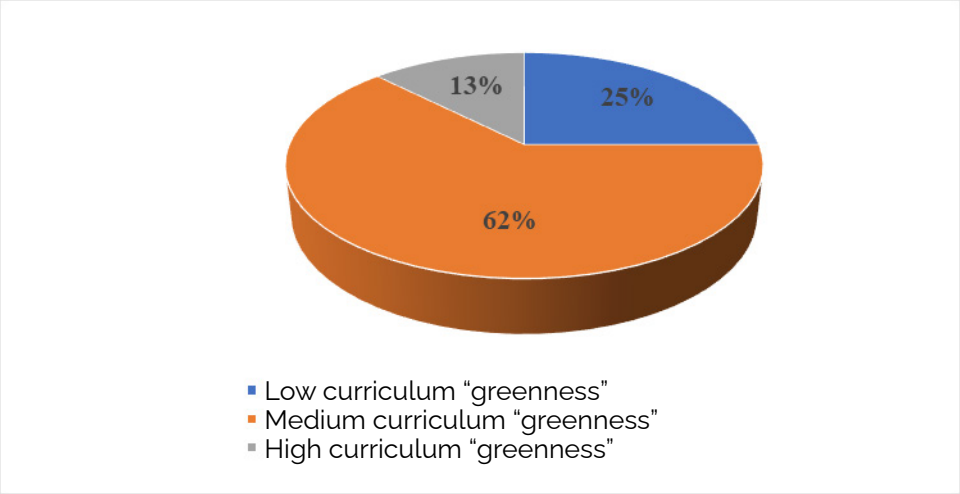
Source: Authors' own research.

As can be seen in Chart 5, out of the total vocational curricula analyzed for the 18 educational profiles/qualifications, 9 curricula or 50% are of low "greenness", 8 or 44% of the

total vocational curricula analyzed have medium "greenness", while there is only 1 curriculum with high "greenness", or 6% of the total vocational curricula analyzed.

Chart 6 shows the structure by "greenness" of the vocational curricula analyzed for the 8 three-year educational profiles/qualifications.

Chart 6: Structure by level of "greenness" of vocational curricula analyzed for 8 three-year educational profiles/qualifications



Source: Authors' own research.

The chart clearly shows that, in contrast to the overall structure, among the three-year educational profiles/qualifications, medium "green" curricula dominate with 62% (5 profiles), including the profiles:

- **Mining Machine Operator** from the Geological and mining and metallurgical occupation/department, where in 50% of the total number of vocational courses there is an integration of contents on "green" economy, sustainability and environmental protection (in 5 out of a total of 10 vocational courses). Regarding the integration of contents on "green" economy, sustainability and environmental protection, in the subject of Protection of Working and Natural Environment for the 1st year, there is a medium integration (3), in the subject of Practical Instruction for the 3rd year there is an initial level of integration (2), and in the subjects of Practical Instruction for the 1st year, Geology for the 2nd year and Practical Instruction for the 2nd year, there is a low level of integration (1). The most frequently used keywords include: Environmental protection, Ecological, Pollution, Human activities (adverse), Waste, Energy efficiency. (Appendix 1.2)

- **Florist Gardener** from the Agriculture and veterinary occupation/department, where in 40% of the total number of vocational courses there is an integration of contents on "green" economy, sustainability and environmental protection (in 4 out of a total of 10 vocational courses). In the vocational courses Agricultural Production for the first year and Technologies in Horticultural Production for the second year, there is a medium integration (3) of the keywords searched. The vocational subject of Practical Instruction for the first year has an initial level of integration (2), and the subject of Plant Protection for the second year has a low level of integration (1) of contents on "green" economy, sustainability and environmental protection. The most frequently used keywords

include: Environmental protection, Organic farming, Ecological. (Appendix 1.7)

- **Material Transfer Machine Operator** from the Traffic (Transport) occupation/department, where in the curriculum, 40% of the total number of vocational courses have integrated contents on "green" economy, sustainability and environmental protection (4 out of a total of 10 vocational courses). In the vocational courses Technology of Handling and Storage of Goods for the third year and Practical Instruction for the third year there is a medium integration (3) of the keywords searched, and in the subjects of Practical Instruction for the 1st year and Practical Instruction for the 2nd year there is a low level of integration (1) of the same words. The most frequently used keywords include: Environmental protection and Waste. (Appendix 1.1)

- **Forester** from the Forestry and wood processing occupation/department, where the curriculum contains an integration of contents on "green" economy, sustainability and environmental protection in 33.3% of the total number of vocational courses (in 4 out of a total of 12 vocational courses). According to the level of integration in the individual vocational courses, the subjects Forest Exploitation for the 2nd year, and Planting and Growing of Forests for the 2nd year are with good integration (4), while the subjects Hunting for the 3rd year and Practical Instruction for the 3rd year are with low integration (1). The most frequently used keywords include: Biomass, Protection of forest crops, Environment. (Appendix 1.8)

- **Electrician** from the Electrical engineering occupation/department, where in the curriculum, there is an integration of contents on "green" economy, sustainability and environmental protection in 41.7% of the total number of vocational courses (in 5 out of a total of 12 vocational courses). Regarding the level of integration by individual vocational courses, the subjects Practical Instruction for the 1st year and Practical Instruction for the 2nd year have good integration (4), while the subjects Electrical Installations and Lighting for the 2nd year, Electrical Networks and Lines for the 2nd year and Practical Instruction for the 3rd year contain low integration (1). The most frequently used keywords include: Environment, Environmental, Pollution and Waste. (Appendix 1.4)

Low "greenness" is found in two educational profiles/qualifications (25%) out of the analyzed 8 educational profiles/qualifications with a duration of three years. These are the following educational profiles/qualifications:

- **Assistant Business Administrator** from the Economic and legal and commercial occupation/department, where 8.3% of the curriculum's total number of vocational courses include integration of "green" economy, sustainability and environmental protection contents (1 of the total 12 vocational courses). It is the subject Practical Instruction for the second year, in which the level of integration of content on "green" skills, sustainability and the environment is low (1). The most frequently used keywords include: Environment, Ethics, Healthy lifestyle. (Appendix 1.3)

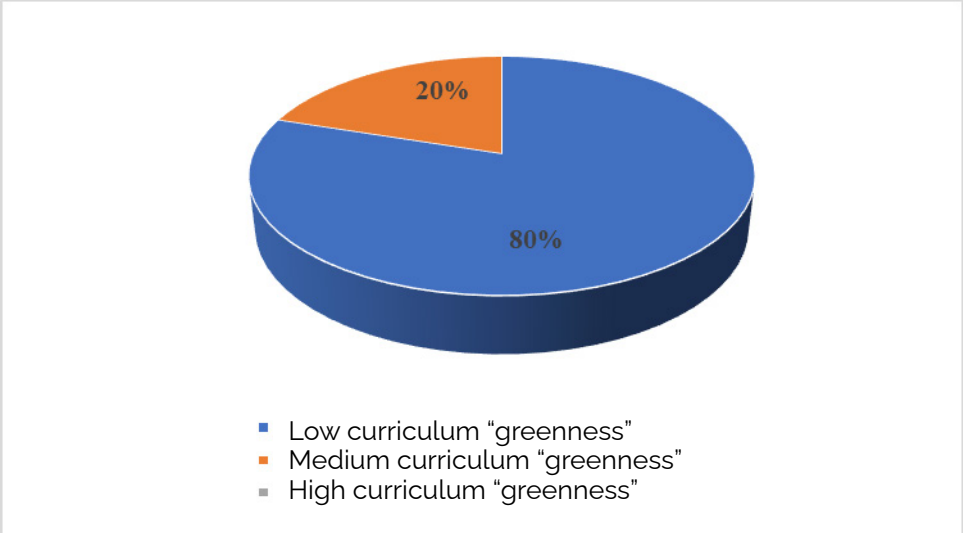
- **Chef** from the Hospitality and tourism occupation/department, where in the curriculum also 8.3% of the total number of vocational courses have an integration of contents on "green" economy, sustainability and environmental protection (1 of the total 12 vocational courses). It is the 1st year Hygiene and Ecology subject, which has a strong (5) integration of content on "green" skills, sustainability and the environment. The most frequently used keywords include: Waste, Pollution and Environmental. (Appendix 1.6)

As can be seen in Chart 6, the three-year vocational curricula include the only program with high "greenness", or:

- **Construction Mechanic** from the Mechanical engineering occupation/department. In this educational profile/qualification, there is an integration of contents on "green" economy, sustainability and environmental protection in 60% of the total number of vocational courses (or 6 out of 10 vocational courses). As to the level of integration per individual vocational courses, the subjects of Basics of Mechanical Engineering for the 1st year and Practical Instruction for the 1st year have medium integration (3), the subject of Processing Technology for the 1st year has initial integration (2), and the subjects of Practical Instruction for the 2nd year, Welding and Related Procedures for the 3rd year and Practical Instruction for the 3rd year have low integration (1). The most frequently used keywords include: Environmental protection, Waste, Social responsibility, Ecological, Pollution. (Appendix 1.5)

The next Chart 7 shows the structure by level of "greenness" of 10 vocational curricula analyzed for four-year educational profiles/qualifications.

Chart 7: Structure by level of "greenness" of vocational curricula analyzed for 10 four-year educational profiles/qualifications



Source: Authors' own research.

As in the aggregate structure, Chart 7 shows that among the four-year vocational education profiles/qualifications analyzed, those with low "greenness" prevail with 80% (8 educational profiles/qualifications), including:

- **Agricultural Management Technician** from the Agricultural and veterinary occupation/department, with a curriculum where in 26.9% of the total number of vocational courses there is an integration of contents on "green" economy, sustainability and environmental protection (in 7 out of a total of 26 vocational courses). With good integration (4) is the subject Technologies in Plant Production for the 4th year, and with initial integration (2) are the subjects: Agricultural Chemistry for the 2nd year; Technologies in Plant Production for the 3rd year; and Learning through Work with an Employer for the 3rd year. The subjects: Hygiene and Food Safety for the 1st year; Agriculture, Fisheries and Veterinary Medicine and other Sectors for the 1st year; and Learning through Work with an Employer for the 4th year have a low level (1) of integration of contents on sustainability and environmental protection. The most frequently used keywords

include: Organic farming, Ecological, Environmental protection, Climate change, Pollution. (Appendix 1.13)

- **Architectural Technician** from the Construction and surveying occupation/department. There is an integration of contents on "green" economy, sustainability and environmental protection in 25.8% of the total number of vocational courses (8 out of a total of 31 vocational courses). Only in the subject Energy Efficiency and Fire Protection for the 3rd year – Elective, there is a strong integration (5), while in the subjects: Detail in Architecture for the fourth year – Elective; Building Materials in Architecture for the second year; Elements and Basics of Urban Planning for the fourth year; Installations for the fourth year – Elective; Standardization, Planning and Management in High-rise Construction for the fourth year; Urban Planning for the fourth year – Elective; and Learning through Work with an Employer for the fourth year, the level of integration is low (1). The most frequently used keywords include: Energy efficiency, Environment, Environmental, Pollution, Sustainable development. (Appendix 1.15)

- **Economic Technician** from the Economic and commercial occupation/department, where in 8 out of a total of 31 vocational courses (25.8% of the total number of vocational courses in the curriculum), there is an integration of contents on "green" economy, sustainability and environmental protection. In the subject of Economic Geography for the first year there is a strong (5) integration; the subjects of Law and State Organization for the second year and Integrated Marketing Communications for the fourth year – Elective, have an initial integration (2), while low levels (1) of integration of contents on "green" economy, sustainability and environmental protection are present in the subjects: Business Communication for the first year; Entrepreneurship and Business for the first year; Entrepreneurship and Business for the second year; Management and Business Planning for the fourth year; and Learning through Work with an Employer for the fourth year. The most frequently used keywords include: Environment, Environmental, Ecology, Code, Sustainable development, Social responsibility. (Appendix 1.11)

- **Landscaping Technician** from the Forestry and wood processing occupation/department, where 22.7% of the total number of vocational subjects in the curriculum contain integration of contents on "green" economy, sustainability and environmental protection (5 out of altogether 22 vocational subjects). In the vocational subject of Environment and Sustainable Development for the 3rd year – Elective, there is a strong level of integration (5); the vocational subject Design of Green Areas for the 4th year has an initial level of integration (2), and the vocational subjects: Ecoclimatology for the 2nd year; Learning through Work with an Employer for the 3rd year; and Economics and Organization for the 4th year – Elective, have a low (1) level of integration of contents on "green" economy, sustainability and environmental protection. The most frequently used keywords include: Environment, Biodiversity, Climate change, Ecological. (Appendix 1.18)

- **Food Technician** from the Chemical and technological occupation/department. In 15.3% of the total number of vocational courses (or in 4 out of altogether 26 vocational courses), there is an integration of contents on "green" economy, sustainability and environmental protection. With an initial level of integration (2) is the subject of Food Microbiology with Sanitation for the 2nd year, and with a low level of integration are the subjects: Raw Materials, Products and Packaging for the 1st year; Chemistry for the 1st year; Business and Entrepreneurship for the 4th year – Elective. The most frequently used keywords include: Environment, Pollution, Waste, Social responsibility. (Appendix 1.17)

- **Railway Traffic Technician** from the Traffic occupation/department, has a curriculum

where 13.7% of the total number of vocational courses include integration of contents on "green" economy, sustainability and environmental protection (4 out of a total of 29 vocational courses). With a good level of integration (4) is the subject of Intelligent Transport Contents for the 4th year – Elective; with an initial level of integration (2) is the subject Vehicles for 1st year, while the subjects Cargo Storage Technology for the 2nd year and Learning through Work with an Employer for the 3rd year are with a low level of integration (1). The most frequently used keywords include: Environment, Environmental, Pollution. (Appendix 1.16)

- **Electronics and Telecommunications Electrical Technician** from the Electrical engineering occupation/department. There is an integration of contents on "green" economy, sustainability and environmental protection in 11.5% of the total number of vocational courses (3 out of a total of 26 vocational courses). With strong integration (5) is the subject Energy Efficiency of Buildings for the 4th year – Elective. The subject of Electrotechnical Materials for the 1st year has an initial integration (2), and the subject of Learning through Work with an Employer for the 3rd year has a low integration (1). The most frequently used keywords include: Energy efficiency, Environmental protection, Ecological, Green, Sustainable development. (Appendix 1.9)

- **Dental Assistant** from the Healthcare occupation/department, where in 11.1% of the total number of vocational courses in the curriculum (or 2 out of a total of 18 vocational courses), there is an integration of contents on "green" economy, sustainability and environmental protection. It is about the subjects Dental Devices, Instruments and Materials for the 2nd year with initial (2) integration level and Basics of Medical Care for the 2nd year with a low (1) integration level. The most frequently used keywords include: Environmental, Environment, Waste, Code. (Appendix 1.12)

As shown in Chart 3, 18% or 2 of the analyzed curricula with a four-year duration, have a medium level of "greenness". It is about the curricula for the following educational profiles/ qualifications:

- **Geological and Mining Technician** from the Geological and mining and metallurgical occupation/department, where there is an integration of contents on "green" economy, sustainability and environmental protection in 48.1% of the total number of vocational courses (13 out of a total of 27 vocational courses). The 1st year course on Natural Environment and Working Environment Protection and 4th year course on Land Reclamation – Elective, have a strong level of integration (5). An initial level of integration (2) has the 3rd year vocational course on Learning through Work with an Employer, while the courses: 1st year Mineralogy; 1st year Modern Technologies of the Labor Market Economic Sectors; 1st year Technical Communication; 2nd year General Geology; 2nd year Petrography; 2nd year Mining Machinery; 2nd year Mining; 3rd year Automation in Mining – Elective; 3rd year Geological Mapping; and 3rd year Hydrogeology, have a low level of integration (1). The most frequently used keywords include: Environmental protection, Environmental, Pollution, Recycling, Preventive protection measures. (Appendix 1.10)

- **Mechanical Energy Technician** from the Mechanical engineering occupation/ department, in the curriculum of which 30% of the total number of vocational courses include integration of content on "green" economy, sustainability and environmental protection (8 out of a total of 27 vocational courses). The vocational courses of Renewable Energy Sources for the 3rd year – Elective and Energy Efficiency and Content on Heating, Ventilation and Air Conditioning for the 4th year – Elective, have a strong integration (5), while in the vocational course of Water Quality Monitoring for the 4th year – Elective, the level of integration of the most frequently used keywords is medium (3). With a low level of integration (1) are the subjects of: Heating and Air Conditioning for the 3rd year; Processing Technology for the 1st year; Business and

Entrepreneurship for the 4th year – Elective; Thermotechnics for the 4th year; Learning through Work with an Employer for the 4th year. The most frequently used keywords include: Energy efficiency, Social responsibility, Renewable sources, Environment, Pollution. (Appendix 1.14)

In order to gain an insight into the possibilities to acquire qualifications with "green" skills in vocational education, an overview was made of the curricula for all other educational profiles/qualifications, i.e., educational profiles/qualifications that were not subject to the in-depth analysis. Due to time constraints, their curricula and courses were identified as per their names and indications from the in-depth analysis that they might have a good (4) and strong (5) level of integration of content on "green" skills, sustainability and the environment. The status established by occupation/department is as follows:

1. **Geological and mining and metallurgical occupation/department**

   - 1st year Natural and Working Environment Protection for the educational profile/qualification of Metallurgical Technician.

2. **Construction and surveying occupation/department**

   - 3rd year and 4th year Energy Efficiency and Fire Safety of Buildings – Elective for the educational profile/qualification of Civil Engineering Technician.

3. **Printer occupation/department**

   - 3rd year Graphic Materials Recycling and 4th year Eco-packaging for the educational profile/qualification of Print Technician.

4. **Economic and legal and commercial occupation/department**

   - 1st year Economic Geography for the educational profile/qualification of Business Administrator.

5. **Electrical engineering occupation/department**

   - 4th year Energy Efficiency of Buildings – Elective, for the educational profiles/qualifications of: Computer Technology Electrical Technician; Industrial Mechatronics and Automation Technician; and Electrical Power Technician.

   - 3rd year Renewable Energy Sources – Elective, for the educational profiles/qualifications of: Electrical Power Technician; and Industrial Mechatronics Technician.

6. **Healthcare occupation/department**

7. **Agricultural and veterinary occupation/department**

   - 3rd year Organic Plant Production – Elective, for the educational profile/qualification of Agricultural Technician.

   - 2nd year Environmental Protection for the educational profile/qualification of Phytomedicine Technician.

8. **Personal Services**

   - 3rd and 4th year Biocosmetics for the educational profile/qualification of Cosmetic Care and Beauty Technician.

9. Mechanical engineering occupation/department

- 3rd year Renewable Energy Sources for the following educational profiles/qualifications of: Computer Management Technician; Mechanical Engineering Technician; Motor Vehicle Mechanical Technician; and Manufacturing Mechanical Engineering Technician.

- 4th year Energy Efficiency and Contents on Heating, Ventilation and Air Conditioning for the following educational profiles/qualifications of: Mechanical Engineering Technician; Motor Vehicle Mechanical Technician; Computer Management Technician.

10. Traffic occupation/department

- 3rd year Transport and Environment for the following educational profiles/qualifications of: Transportation and Forwarding (Shipping) Technician; Road Traffic Technician; Railway Traffic Technician; and Traffic Logistics Technician.

11. Textile and leather occupation/department

12. Hospitality and tourism occupation/department

- 1st year Hygiene and Ecology for the three-year educational profiles/qualifications of Waiter and Confectioner.

- 1st year Hygiene and Ecology for the following four-year educational profiles/qualifications: Hotel Tourism Technician; Event and Animation Technician; Rural Tourism Hospitality Technician; Hospitality Technician.

- 4th year Sustainable Development in Tourism for the following educational profiles/qualifications of: Hotel Tourism Technician; Event and Animation Technician; Rural Tourism Hospitality Technician; Hospitality Technician.

13. Chemical and technological occupation/department

- Regarding the educational profile/qualification of Environmental Technician with a four-year training duration, the subjects of: Sustainable Development for the 3rd year; Renewable Energy Sources for the 3rd year; Pollution and Protection of Water, Soil and Air for the 3rd year; Climate Change for the 4th year; Renewable Energy Sources for the 4th year; Waste Management for the 4th year.

- 3rd year Protection of Natural and Working Environment for the educational profile/qualification of Chemical Laboratory Technician.

- 4th year Ecology and Environmental Protection – Elective, for the educational profile/qualification of Chemical and Cosmetic Product Technician.

- 4th year Alternative Energy Sources for the following educational profiles/qualifications of: Environmental Protection Technician; and Chemical Laboratory Technician.

14. Forestry and wood processing occupation/department

- 4th year Wood Biomass for the educational profiles/qualifications of Woodworking Technician; and Furniture and Interior Design Technician.

- 3rd year Forest Growing; Forest Eco-content – Elective; and 4th year Protection against Erosion for the educational profile/qualification of Forestry Technician.

- 4th year Environment and Sustainable Development for the educational profile/qualification of Forestry Technician.

- 4th year Forest Protection for the educational profile/qualification of Forestry Landscaping Technician.

From the analysis performed, a conclusion can be drawn that in the secondary vocational education in the Republic of North Macedonia, there are mainly two approaches through which curricula "greenness" is achieved, including:

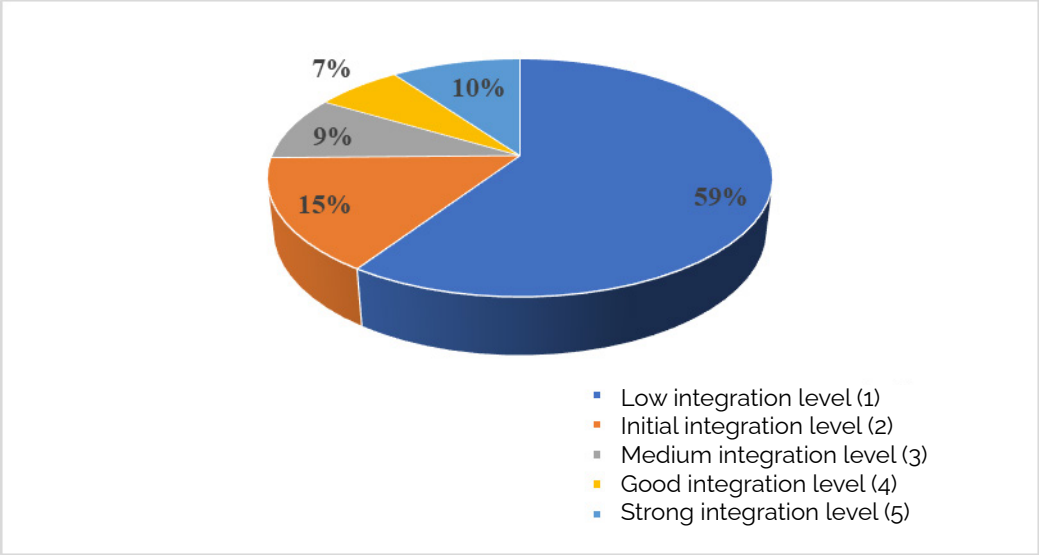
I. Vocational courses/subjects that are fully "green" and designed to develop awareness of sustainability and environmental protection, and where the level of relevant content integration is 3-5 (medium to strong integration). Such subjects in three-year secondary vocational education are the 1st year Natural and Working Environment Protection for the educational profile/qualification of Mining Machine Operator; and the 1st year Hygiene and Ecology for the educational profile/qualification of Chef. In the four-year vocational education, "green" vocational subjects include: 3rd year Energy Efficiency and Fire protection – Elective, for the educational profile/qualification of Architectural Technician; 3rd year Environment and Sustainable Development – Elective, for the educational profile/qualification of Landscaping Technician; 4th year Energy Efficiency of Buildings – Elective, for the educational profile/qualification of Electronics and Telecommunications Electrical Technician; 1st year Natural and Working Environment Protection, and 4th year Land Reclamation – Elective, for the educational profile/qualification of Geological and Mining Technician; and 3rd year Renewable Energy Sources – Elective, and 4th year Energy Efficiency and Contents on Heating, Ventilation and Air Conditioning – Elective, for the educational profile/qualification of Mechanical Energy Technician. Here, we should also add the courses from the educational profile of Environmental Technician in the Chemistry and technology occupation, with a four-year duration, such as: 3rd year Sustainable Development; 3rd year Renewable Energy Sources; 3rd year Pollution and Protection of Water, Soil and Air; 4th year Climate Change; 4th year Renewable Energy Sources; 4th year Waste Management, as well as the subjects of 3rd year Natural and Working Environment Protection for the educational profile/qualification of Chemical Laboratory Technician, and 4th year Ecology and Environmental Protection – Elective, for the educational profile/qualification of Chemical and Cosmetic Products Technician.

II. Integration of sustainability and environmental protection contents in vocational courses, mainly in modular units' components (Contents and concepts, and Activities and methods), where the level of integration of relevant contents is 1-3 (low to medium integration).

For the purposes of this research, a total of 351 vocational courses in the curricula analyzed for 18 educational profiles/qualifications were determined to establish the level of integration of contents on "green" economy, sustainability and environment, and such contents were identified in 91 vocational courses. Within those 91 vocational courses, the number of subjects that are completely "green" is 9 (10%) and all of them have a strong level (5) of integration. What is the

distribution of other levels of content integration regarding "green" economy, sustainability and environmental protection among the other vocational courses analyzed can be seen in the following Chart 8.

Chart 8: Structure of levels of integration from 1 (low) to 5 (strong) in a total of 91 vocational subjects analyzed for 19 educational profiles/qualifications



Source: Authors' own research.

As presented in Chart 8, more than half of the analyzed vocational subjects, or 59% (54 subjects), have a low level (1) of integration of contents on "green" economy, sustainability, environmental protection and "green" skills. This means that in these subjects, a small number of general keywords was identified in the methodological units' components, usually in the mandatory components of Contents and Concepts, including some other mandatory components. It should be emphasized that in the 54 vocational subjects with a low level (1) of integration of contents on "green" economy, sustainability and environmental protection, the majority of vocational subjects include Learning through Work with an Employer, and Practical Instruction. When clarifying the methodological approach, it was previously stated that the presence of keywords in the Activities and Methods component was assessed in these subjects. Provided this indicator, in the curricula analyzed, 15 courses of Practical Instruction and 9 courses of Learning through Work with an Employer were identified, or a total of 24 courses, where 16 courses altogether have a low level (1) of integration.

There are a total of 14 vocational subjects (15%) with an initial level of integration (2), which means that in their curricula, a small number of general keywords were identified in the components of Goals and Objectives, Content and Concepts, including some other mandatory components. This includes two courses of Learning through Work with an Employer and two courses of Practical Instruction (4 courses altogether).

A medium level of integration (3) was identified in a total of 8 vocational subjects (9%), which means that they have a greater number of general and specific keywords in the components of Goals and Objectives, Modular Unit, Contents and Concepts, and in some other mandatory components. There is also a medium level (3) of integration in 2 courses of Practical Instruction.

In the courses analyzed, there are a total of 6 vocational courses (7%) with a good level (4) of integration. Therein, a small number of diverse keywords or a larger number of general

keywords are identified in the components Objective; Modular Unit; Learning Outcomes; Contents and Concepts; Activities and Methods; Assessment Criteria, including some other mandatory components. There is also a good level (4) of integration in 2 courses of Practical Instruction.

There is a strong level (5) of integration of contents on "green" economy, sustainability and environmental protection in 9 vocational subjects (10%) and among them, there is not a single subject of Learning through Work with an Employer or Practical Instruction. They have a larger number of diverse keywords identified in the components: Objective; Modular Unit; Learning Outcomes; Contents and Concepts; Activities and Methods; Assessment Criteria, and in some other mandatory components. As we said, these vocational courses are completely "green" and designed to develop awareness of sustainability and environmental protection. It should be noted that the largest part, or 7 of the vocational subjects with a strong level (5) of integration are elective.

2.5.5.2. Primary research on perceptions, opportunities and needs for "green" skills in secondary vocational education in the Republic of North Macedonia

Primary data to research the perceptions, opportunities and needs for "green" skills and their potential in secondary vocational education in the Republic of North Macedonia were collected from state institutions working in the field of education (Center for Vocational Education and Training - CVET), young people, high school students from country's vocational schools, as well as from the business sector (private company employers). Semi-structured interviews, unstructured observation and survey questionnaires were applied as research methods and techniques.

2.5.5.2.1. Interview with educational institutions – methodological approach and findings

The gathering of primary data from educational institutions as relevant stakeholders was made using semi-structured interviews and unstructured observation.

The main advantage of the key informant interviewing research technique is that information comes directly from knowledgeable people who often provide data and insight that cannot be obtained by other methods. However, the selection and commitment of the informant is one of the biggest limitations of this technique. Namely, it is not easy to prove that interviewees are well-versed and informed, and that they provide their information with the required dedication and concentration.

Semi-structured interviews are basically qualitative interviews and they were conducted using some pre-designed forms that specified the content and questions to be covered. Relevant stakeholders were selected for each institution/stakeholder individually and they included generally well-informed persons (so-called key informants). The semi-structured interviews' content and questions were targeted to each individual stakeholder, and they were defined (prepared) only after an extensive initial secondary data analysis was carried out regarding the specific stakeholder and its relevance for integrating the contents of sustainable development and "green" skills in secondary vocational education in North Macedonia. The form used for

collecting primary data by a semi-structured interview is given in Appendix 2.

Unstructured observation was used to gather additional data indicating the perceptions, opinions and viewpoints of relevant stakeholders regarding the possibilities, potentials and capacities for integrating the contents of sustainable development and "green" skills in secondary vocational education. The forum entitled "Skills for a Green City" was used as a data source, which was organized within the Project "European Platform for Excellence in Vocational Education and Training for 'Green' Innovations – GREENOVET" and the "European Week of Vocational Skills" initiative, held on 17 May, 2022, in Skopje[53]. Links to the publicly available presentations from this forum are provided in Appendix 3.

This forum's presentations were prevailed by the view that competent institutions in the country are aware of the need for environmental protection to be integrated in all sectors and sectoral policies. According to the Deputy Minister of Environment and Physical Planning, in the last few years, the growing public awareness of the role of a healthy environment for a better-quality life of citizens, including the need for a quick and fair transition to a "green" economy, has been visible. Such transition also gives rise to the need to create new "green" jobs, or about 80,000 by 2030. According to her, these changes also require changes in the educational process, i.e., retraining and upskilling regarding professional skills, thus ensuring a workforce with adequate vocational training required to keep abreast with the needs, ensure understanding and knowledge, and develop an innovative approach and application of innovative techniques and technologies in production processes.

The Director of the Center for Vocational Education and Training pointed out that the Environmental Protection Technician qualification was already introduced, thus providing professional staff for this area, and students are trained after completing each technological process to know how to handle waste such that it is not harmful to the environment. According to him, cooperation with the business sector plays a significant role both for the promotion of secondary vocational education in general and "green" skills. In support of this argument, he stated that the total number of students enrolled in vocational schools in just one year increased by six percent and that the number of dual classes was growing significantly, where in the 2020/2021 school year there were 11 dual classes only to increase to 97 classes in 2021/2022 school year, while this school year is expected to see more than 200 dual classes.

The Center for Excellence in Vocational Education and Training for the Development of "Green" Innovations, established at the Faculty of Mechanical Engineering at Ss. Cyril and Methodius University in Skopje, was also promoted at the forum as one of the four such centers in Europe. This Center, in addition to training for young people to create an innovative, inclusive and sustainable economy, is also expected to offer training for teachers from secondary vocational schools to acquire "green" skills, which can then be transferred to students.

The forum's general conclusion was that vocational skills are key to a faster "green" transition of the economy and society in general, and therefore, it is necessary for all stakeholders to actively and intensively work on development and inclusion thereof into the curricula and educational processes.

From the semi-structured interview conducted with representatives of the Center for Vocational Education and Training (CVET), valuable findings and knowledge were gained about the possibilities, potentials and capacities for integrating sustainable development and "green" skill contents in secondary vocational education. Namely, within its own competences and capacities, in recent years, CVET has made a significant step forward regarding the development of vocational education, especially in view of matching vocational education with the labor

[53] Union of Chambers of Commerce of Macedonia, "Creating a broad front to support vocational skills and green innovations" https://chamber.mk/%d1%81%d0%be%d0%b7%d0%b4%d0%b0%d0%b2%d0%b0%d1%9a%d0%b5-%d0%bd%d0%b0-%d1%88%d0%b8%d1%80%d0%be%d0%ba-%d1%84%d1%80%d0%be%d0%bd%d1%82-%d0%b7%d0%b0-%d0bf%d0%be%d0%b4%d0%b4%d1%80%d1%88%d0%ba%d0%b0-%d0%bd/ - accessed on 19 May 2022.

market. CVET points out that interventions in vocational education and training are very sensitive and conditioned by a number of factors. Bearing in mind this specificity, interventions made so far in the area of sustainable development, including the acquisition of "green" skills in secondary vocational education, in the largest number of cases refer to their cross-curricular integration. The following stand out as particularly significant activities:

- The Concept of Learning through Work adopted on 13 April 2020 by Decision No. 98-4305/22 on the part of the Minister of Education and Science;
- Occupation Standards Form – Occupation Functions Item 9: Occupational Safety and Health and Environmental Protection;
- Curricula adopted on elective instruction regarding Energy Efficiency of Buildings for the 4th year: Construction and surveying occupation 11-13/364; Mechanical engineering occupation 11-13/374; and Electrical engineering occupation 11-13/384, registered in the Center for Vocational Education and Training under number 07-799/1 on 21 August 2014;
- Curricula adopted for 4 departments where there are syllabi in the area of sustainable development and "green" skills: Construction and Surveying Department 13-6550/1 dated 11 June 2019; Electrical Engineering Department 13-6562/1 dated 11 June 2019; Mechanical Engineering Department 13-6560/1 dated 11 June 2019; and Chemistry and Technology Department 13-6557/1 dated 11 June 2019;
- Curricula adopted in the area of sustainable development and "green" skills:

- **Construction and Surveying Department**:
  - ✓ Energy Efficiency and Fire Protection – Elective course for the 3rd year for Architectural Technician 13-8050/308, registered in CVET under no. 08-1454 on 31 December 2019;
  - ✓ Energy Efficiency and Fire Safety of Buildings – Elective course for the 3rd year for Civil Engineering Technician 13-8050/284, registered in CVET under no. 08-1430/1 on 31 December 2019;
  - ✓ Energy Efficiency and Fire Safety of Buildings - Elective course for the 4th year for Civil Engineering Technician 13-8050/724, registered in CVET under no. 08-2151/1 on 31 December 2019.
- **Electrical Engineering Department**:
  - ✓ Renewable Energy Sources – Elective course for the 3rd year for Electrical Power Technician 13-8050/570, registered in CVET under no. 08-1676/1 on 31 December 2019;
  - ✓ Energy Efficiency of Buildings – Elective course for the 4th year for Electronics and Telecommunications Electrical Technician 13-8050/821, registered in CVET under no. 08-2189/1 on 31 December 2019;
  - ✓ Energy Efficiency of Buildings – Elective course for the 4th year for Computer Technology and Automation Electrical Technician 13-8050/830, registered in CVET under no. 08-2198/1 on 31 December 2019;

- ✓ Energy Efficiency of Buildings – Elective course for the 4th year for Electrical Power Technician 13-8050/824, registered in CVET under no. 08-2192/1 on 31 December 2019.

- **Mechanical Engineering Department**:

  - ✓ Renewable Energy Sources – Elective course for the 3rd year for qualifications: Computer Management Technician; Mechanical Engineering Technician; Mechanical Energy Technician; and Motor Vehicles Mechanical Engineering Technician 13-8050/375, registered in CVET under no. 08-1386/1 on 31 December 2019;

  - ✓ Renewable Energy Sources – Elective course for the 3rd year for the qualification of Production Engineering Technician 13-9098/7, registered in CVET under no. 08-338/1 on 02 July 2021;

  - ✓ Energy Efficiency and Heating, Ventilation and Air Conditioning Systems – Elective course for the 4th year for qualifications: Computer Management Technician; Mechanical Engineering Technician; Mechanical Energy Technician; and Motor Vehicles Mechanical Engineering Technician 13-8050/790, registered in CVET under no. 08-2088/1 on 31 December 2019.

- **Chemistry and Technology Department**:

  - ✓ Natural and Working Environment Protection - teaching course for the 3rd year for the qualification of Chemical Laboratory Technician 13-8050/259, registered in CVET under no. 08-1466/1 on 31 December 2019;

  - ✓ Renewable Energy Sources - teaching course for the 3rd year for the qualification of Environmental Protection Technician 13-8050/254, registered in CVET under no. 08-1471/1 on 31 December 2019;

  - ✓ Sustainable Development - teaching course for the 3rd year for the qualification of Environmental Protection Technician 13-8050/253, registered in CVET under no. 08-1472/1 on 31 December 2019;

  - ✓ Pollution and Protection of Water, Soil and Air - teaching course for the 3rd year for the qualification of Environmental Protection Technician 13-8050/252, registered in CVET under no. 08-1473/1 on 31 December 2019;

  - ✓ Ecology and Environmental Protection - teaching course for the 4th year for the qualification of Cosmetic and Chemical Products Technician 13-8050/619, registered in CVET under no. 08-1988/1 on 31 December 2019;

  - ✓ Ecology and Environmental Protection - teaching course for the 4th year for the qualification of Environmental Protection Technician 13-8050/619, registered in CVET under no. 08-1988/1 on 31 December 2019;

  - ✓ Renewable Energy Sources - teaching course for the 4th year for the qualification of Environmental Protection Technician 13-8050/608, registered in CVET under no. 08-1977/1 on 31 December 2019.

CVET points out that the educational aspects regarding sustainable development and "green" skills are also integrated in the models/mechanisms developed to enhance professional competences and practical skills of vocational education staff. Namely, in the standards of

occupations in the section on occupation functions (Item 9), key aspects defining the knowledge and skills in the area of health, safety and protection at work and environmental protection are defined. Also, by the 2019 vocational education reform, almost every department has as follows:

- Curricula entitled as Natural and Working Environment Protection;
- Other curricula where *modular units* related to landfills, manners of maintenance thereof and disposal sites, are presented,
- *Learning outcomes* related to: the impact of activities within the sectors affecting water, air and soil pollution; measures taken to protect water, air and soil; how to handle chemical substances; protection while working with hazardous substances; implementation of regulations and MKS standards on environmental protection and occupational safety; code of conduct; energy sources and energy transformation processes; energy resources that are non-renewable energy sources; renewable energy sources; energy sources' utilization; technological solutions for energy use and transformation; preparation for learning through work; field reclamation; environmental effects of landfills and tailings storage facilities; reclamation of landfills and tailings storage facilities; waste recycling; human resource planning and protection in forest exploitation; measures for cultivation and protection of forest crops; cultivation measures such as: pollination, filling and irrigation of forest crops; forest crops protection; global warming as a result of greenhouse gas emissions; protocols; climate change adaptation; causes leading to global warming; greenhouse gas effects; manners of climate change adaptation; elements causing climate change; forest vegetation climate change adaptation; biodiversity and characteristics thereof; desertification, land degradation, biodiversity protection; natural factors influencing the creation and development of "green" areas; environmental threat level; substance and concepts of social responsibility and ethics, classification of social responsibility and ethics; operational regulations on waste material storage; rules on due and safe workplace maintenance.

For more successful implementation of educational aspects related to sustainable development and "green" skills in the educational process, CVET also provides adequate professional training to teachers in vocational and theoretical subjects. Thus, the Center for Vocational Education and Training's advisors provide professional training to teachers who implement Elective Curricula on the Energy Efficiency of Buildings for the 4th year in Construction and Surveying Department, Mechanical Engineering, and Electrical Engineering Departments. Also, general and technical assistance/training is provided to teachers implementing the reformed curricula, and thus, also to teachers implementing programs in the area of sustainable development and "green" skills in technical education.

As to the international cooperation, CVET reports that during the participation of their representatives in international symposia, conferences, seminars and study visits to similar centers and institutions in other countries (either online or via direct contact), they regularly exchange experiences, knowledge, views and ideas about sustainable development and "green" skills in vocational education, although international meetings have almost always had different priority goals.

With regard to the curricula on Learning through Work with an Employer, CVET clarifies that in order to enhance, strengthen and promote the cooperation between vocational schools and employers (companies), these subject areas as well, have contents from the field of sustainable development and "green" skills. In particular, when drafting the plan for practical training of students with an employer, the implementation of contents in the field of sustainable development and "green" skills is also planned.

CVET is continuously working on the development of standards and educational qualifications, and its advisors are members of all working groups for the preparation of: standards of occupations; standards of qualifications; curricula and programs; examination programs, etc. They are also members of Sectoral Commissions and the National Board for the *Macedonian Qualifications Framework* (MQF), where work is being done to promote sustainable development and "green" skills in qualifications. With regard to this, they point out that when developing any new and revised standards of occupations and standards of qualifications, content related to sustainable development and "green" skills is taken into account, but it is not equally represented in all qualifications and departments. The highest share of contents on sustainable development and "green" skills is found in the qualifications of 4 departments: Construction and surveying; Electrical engineering; Mechanical engineering; and Chemistry and technology. In addition, any changes made to occupational standards championed by employers, are translated into the relevant documents (qualification standards, curricula, syllabi, examination programs) at the educational level. In this sense, CVET points out that all aspects of occupations' standards are taken into account, including the aspects of education on sustainable development and "green" skills, as evidenced by the number of the above-listed curricula and syllabi where such skills are represented.

However, CVET points out that during any research, the provision or quality assurance in vocational education, including the monitoring of the total number of students having practical training and the total number of employers accepting students for practical training, as well as the possibility of practicing "green" skills and sustainable development skills, is not analyzed separately.

Also, in relation to the possibility of providing guidelines regarding the implementation of educational aspects on sustainable development and "green" skills in the educational process while organizing and implementing the counseling, coaching and mentoring of teachers and trainers of vocational subjects in secondary vocational schools, CVET mentions the existing Annual Program for the Professional Development of Teachers and Professional Associates in Primary and Secondary Schools, which was jointly developed by the Bureau for Development of Education (BDE), the State Education Inspectorate (SEI) and CVET, based on the needs expressed by teachers to improve their competencies. However, as they point out, it should also be said that in terms of available material, on the existing Platform for Professional Development of Vocational Education Staff, there are still no recorded materials and training to support teaching staff in their realization of education on sustainable development and "green" skills.

As to the possibility of acquiring competences for "green" skills within vocational education, CVET emphasizes that Learning through Work with an Employer is part of practical education in technical vocational education, i.e., practical training of students in a company. It is implemented in line with an adopted Program on Learning through Work with an Employer, and it has a flexible approach and allows companies to adjust the Program realization according to their needs and possibilities as the Program is being fully implemented. The Plan for Realization of Learning through Work with an Employer, which shall be in accordance with the Curriculum requirements, is developed jointly by the company and the vocational school. The collaborative approach to planning and implementation, as well as the flexible Curricula for Learning through Work with an Employer, provide a good opportunity for the stakeholders involved (the vocational school and the company) to integrate tasks, and thus, activities that will enable the enhancement of "green" skills among students. The same may be done during the realization of the ferial practice.

In addition, CVET emphasizes that there is an opportunity to enhance "green" skills among students through contents programmed by the school and represented by two hours per week for each class, regardless of whether it is the first, second, third or fourth year of education, where schools prepare their own curricula, which are approved by the Center.

From the semi-structured interview conducted with representatives of the Bureau for

Development of Education (BDE), additional insights were gained regarding the development of sustainable development education and green skill acquisition in secondary vocational education. Namely, in addition to those listed above, the BDE emphasizes that curricula in the field of sustainable development and "green" skills are also integrated in the Biology Curriculum for the 1st year (modularly designed) regarding all qualifications from the Healthcare and Social Protection Department; all qualifications from Agriculture, Fisheries and Veterinary Department; Cosmetic Care and Beauty Technician; Cosmetic and Chemical Products Technician; Food Technician, Environmental Protection Technician; all qualifications from the Forestry and Wood Processing Department, including the Biology Curriculum for the 3rd year (modularly designed) for the Healthcare and Social Protection Department; Agriculture, Fisheries and Veterinary Medicine Department; Chemistry and Technology Department; Forestry and Wood Processing Department.

Regarding the national standards on competences that students shall possess at the end of secondary vocational education, the BDE indicates that they are a set of competences that should meet the personal, social and professional needs of any individual in the process of lifelong learning throughout their qualification or part thereof. Key competences in the standards of a particular qualification are always a combination of knowledge, skills and attitudes appropriate to the professional context. In particular, green skills can be noted in national competence standards primarily depending on the qualification standard type and needs. In addition, national occupational standards are the basis for designing qualification standards and they describe the types and levels of competences and learning outcomes required for VET qualifications and technical qualifications, particularly related to specific occupations in the future. They shall be revised and updated as the working practices, labor market needs and qualifications change.

BDE makes sure that teaching content on sustainable development and green skills is present in textbooks and technical literature for secondary education. They point out that according to vocational education curricula, when analyzing the textbooks and technical literature, the following situation shall be observed: if the topics of sustainable development and green skills exist in the curricula, then they are expected to be present in textbooks and technical literature, as well.

BDE has realized numerous projects in line with the educational process ongoing needs, including the promotion of sustainable development education and within its framework, the development of green skills acquisition education, where secondary vocational schools have also taken part. The Green Package and the Globe Program are particularly important in this regard.

As to the instruments for monitoring and evaluation of teachers and their professional associates' performance, BDE points out that they contain segments through which the following are perceived: instruction planning and preparation; lesson planning; teaching and learning content – methods and strategies; assessment of student achievement; communication; stimulating environment and teaching aids' use; classroom organization and management; students' response; teacher's professional development and professional preparedness, etc. Within the process of monitoring and evaluation of teachers and professional associates' performance, the aspects of sustainable development and green skills education are evaluated in a targeted manner, within certain situations and in line with the needs for monitoring/evaluating the individual's performance.

As to the professional development needs of secondary school teaching staff, BRO says that they have analyzed professional papers and doctorates produced by BRO employees that could give rise to the possibility of proposing topics regarding sustainable development and green skills education.

Furthermore, BDE underlines that the topic of sustainable development and green skills education is included in the Long-term Plan regarding the training needs of both primary and

secondary schools' educational staff (2021-2023). Namely, in addition to the development of national educational standards, curricula and lesson plans, including the provision of objective monitoring of students and teachers' achievements and development of the concept of inclusiveness in education, the priority goals of BDE also include enhancement of educational staff competencies, as well as strengthening the competencies for sustainable development and green skills education.

As for continuous training, BDE points out that in the selection of accredited training program(s) offered for 2022, there is no training that is directly related to sustainable development and green skills education, but there is a certain number of trainings that touch upon some topics related to sustainable development education that can be easily correlated with the three sustainable development pillars, if the service provider sees such possibility.

2.5.5.2.2. Exploratory research (survey of high school students and employers) – methodological approach and results

For the purposes of this study, an exploratory research was also conducted. Exploratory research as a qualitative methodological approach is used to research issues that are relatively new and have not been studied in depth before, so therefore, it is often called an interpretive research or approach, which does not necessarily lead to concrete conclusions. Here, an exploratory research approach was used to gain a general idea of the level of awareness of "green" skills, including the perceptions and valuation of "green" skill competences by vocational high school students and employers. In this sense, the exploratory research was carried out on a small, randomly selected sample, with the aim of gaining general knowledge and comparatively analyzing the findings in order to come up with relevant clues about which aspects should future research and efforts focus on and how to utilize "green" skill opportunities and potential in secondary vocational education in the Republic of North Macedonia.

The exploratory research limitation is that it does not provide conclusive findings, given that it is biased or subjective due to a lack of pre-existing knowledge about the topic researched. Although the exploratory research is conducted on a small sample and the results cannot be generalized, this research still makes it possible to understand a given research question. Also, this type of research gives an indication of whether research questions are well conceptualized and therefore, it provides an excellent basis for future research on a larger and representative sample and elicitation of conclusive findings that can be generalized.

For this research, an online survey of high school students from secondary vocational education and employers in the country was conducted as a method of primary data collection. For this purpose, customized survey questionnaires were prepared, both for high school students and employers, and distributed electronically.

The approach to the formulation of survey questionnaire questions intended for high school students is based on the distribution of "green" skills by clusters of skills that best fit basic educational competences. Considering that the research is done for the purpose of examining the possibilities and potential for acquiring qualifications with "green" skill competences in secondary education, the approach of clustering (classifying) "green" skills originates from the basic division of competences which are the substance of the educational process. In the education system, the link between the terms "competence" and "skill" has always existed, where competences are the basis, and skills are the upgrade. The education system is based on competence transfer, since any competence is a measurable model of knowledge and behaviors that the student shall adopt and demonstrate in order to be assessed. Competences acquired further enable

students to qualify for the performance of specific work tasks at specific workplaces. Compared to the competence, which is a system of knowledge, the skill is a more focused activity and implies a sequence of actions to be taken and logical grouping thereof, and it refers to the ability to apply knowledge (competence) so that students can be qualified to perform specific work tasks from some vocational profile or occupation. This approach is also adopted in the European Qualifications Framework where skills are described as knowledge, cognition, understanding (implying the use of logical, intuitive and creative thinking) and practice (implying the possession of practical skill for manual work and the use of methods, materials, tools and instruments). Hence, for the purposes of this research, the "green" skills placed in the context of the four basic competences that should be transferred to students through the educational process include:

- **Cognitive competences** that imply: developing an environmental awareness and willingness to learn about sustainable development; developing analytical skills to assess environmental risks; interpreting and understanding both the need for change and measures required; and developing innovative skills to identify opportunities and adopt new approaches to meet the "green" economy challenges (Developing awareness and responsibility for how to preserve the environment – sustainable thinking for sustainable development);

- **Interpersonal competences** that imply: the acquisition of coordination, management and business skills to facilitate holistic and interdisciplinary approaches that include economic, social and environmental goals; communication and negotiation skills to discuss conflicting interests in complex contexts; marketing skills to promote environmental products and services (Sustainable environment management, efficient use of available resources, management in a way that minimizes the negative impact of human society on the environment and natural resources);

- **Intrapersonal competences** that imply: the acquisition of adaptability and transferable skills (learning system adoption) that help students even in the future to easily learn how to apply new technologies and processes required for a "green" economy; adoption of entrepreneurial skills in order to take advantage of the opportunities offered by lower energy consumption and low carbon emission technologies (Skill to practice energy saving and eco-content protection);

- **Operational competences** (technical) which imply: the acquisition of skills for performing operations; practical knowledge related to specific "green" activities and ecological production; and cooperation with external actors, including customers and suppliers (Applicable technical knowledge to enhance energy efficiency and deal with garbage/waste; efficient use of working materials; implementation of "green" procurement, etc.).

The survey questionnaire for high school students consisted of two parts.

- Part One - intended for collecting general data or information on age and occupation.

- Part Two – short, structured questions about how familiar high school students are with "green" skills, including their opinion regarding the "green" skills' usefulness, most important aspects of "green" skills, "green" skills and employability.

As previously mentioned, employers were also included in the exploratory research, considering that their companies (enterprises) are potential labor market employers for all individuals with completed secondary vocational and/or higher education qualified with

competences that include "green" skills. Since it is about an exploratory research, by collecting primary data through short survey questionnaires whose main purpose is to establish the existence of public awareness and attitudes regarding the perceptions of high school students and employers, the same approach was applied to both employers and high school students. When formulating the questions for employers, the same clustering of "green" skills was used, which enabled comparability of the results obtained.

The survey questionnaire for employers consisted of two parts.

- Part One - intended for collection of general data or information on sector affiliation of the company managed by the employers.
- Part Two – short, structured questions about how important "green" skills are considered to be related to the jobs in employers' companies, as well as employers' opinion regarding the usefulness of "green" skills for their employees, the most important aspects of "green" skills for their activity, etc.

Most of these short, structured questions in the survey questionnaires were closed-end questions, which means providing possible answers or options from which the respondent can choose. The survey questionnaires used to collect primary data from high school students and employers are given in Appendix 4 and Appendix 5.

The following is an overview of the survey results of high school students from vocational education and the survey of employers, processed, descriptively interpreted and presented in charts.

As previously mentioned, the exploratory research sample was small and consisted of respondents from several occupations/departments, namely secondary school students from 6 occupations/departments, mainly from the third and fourth year of vocational education, and employers from 7 sectors, mainly from the mechanical engineering sector.

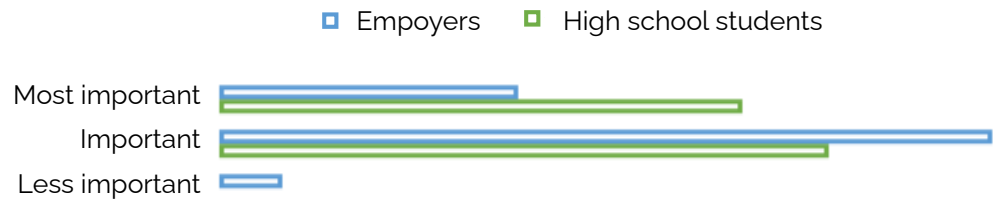
In relation to what "green" skills represent for them, where only one answer was possible, the majority of high school students surveyed, said that for them "green" skills mean developing awareness of and responsibility for environment preservation (sustainable thinking for sustainable development). For a very small part of them, "green" skills are applicable technical knowledge for improving energy efficiency, garbage/waste management, efficient use of working materials, implementation of green procurement, etc., or sustainable management of the environment (effective use of available resources, management in a way that will minimize the negative impact of humanity on the environment and natural resources). The skill of practicing energy saving and ecosystem protection is not considered by any of the respondents to be a green skill.

When asked whether they think that "green" skills are or could be important for jobs in their companies, all employers answered in the affirmative.

When given the opportunity to grade the importance of different "green" skills' aspects, high school students and employers prioritized them differently.

Chart 9: Comparative overview of responses to the question: According to you, what are the most important/most relevant aspects of "green" skills for the jobs in your company?

- **Development of awareness and responsibility to preserve the environment (sustainable thinking for sustainable development)**



- **Applicable technical knowledge to enhance energy efficiency, garbage/waste management, efficient use of work materials, implementation of green procurement, etc.**

- **Skill to practice energy saving and ecosystems protection**

- **Sustainable environmental management (efficient use of available resources, management in a way that will minimize the negative impact of human society on the environment and natural resources)**

Source: Authors' own reserach.

As can be seen in Chart 9, high school students most often value their first choice of Developing awareness and responsibility to preserve the environment (sustainable thinking for sustainable development), as an important or most important "green" aspect, but here it must be noted that none of them chose that it was a less important aspect. Most of the respondents consider the most important aspect of "green" skills to be sustainable environmental management (efficient use of available resources, management in a way that minimizes the negative impact of human society on the environment and natural resources). As a less important aspect of "green" skills, high school students consider the skill of practicing energy saving and ecosystem protection, and the applicable technical knowledge for energy efficiency enhancement, garbage/ waste management, efficient use of working materials, implementation of green procurement, etc. Unlike them, employers usually consider these two aspects of "green" skills to be the most important or important, while the awareness and responsibility for preserving the environment

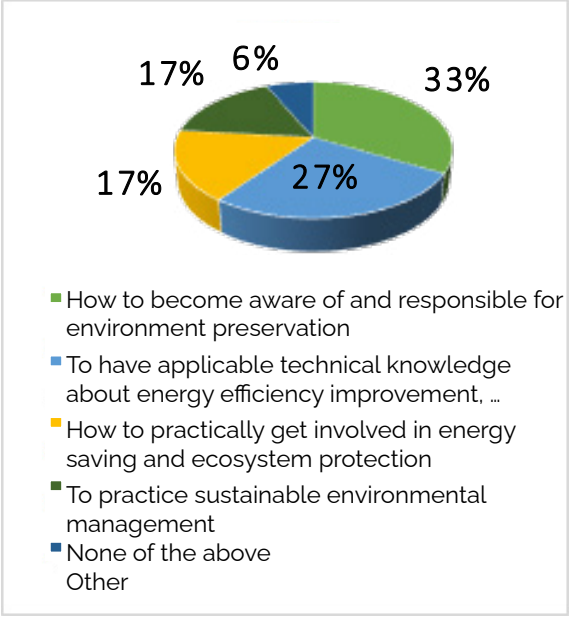
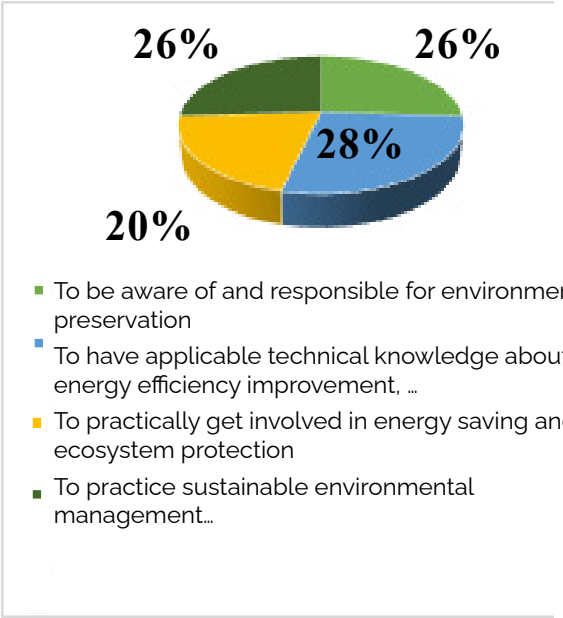
and its sustainable management are considered important or less important by most employers. Also, all surveyed employers think that their employees need "green" skills, and the majority also claim that their employees have "green" skills.

It is interesting to compare the answers about what high school students think are the "green" skills they learn, on the one hand, and what employers think about the "green" skills their employees need, on the other hand. Here, the respondents were given the opportunity to either make a multiple choice or specify an additional answer (if required).

None of the surveyed high school students used the opportunity for an additional answer or the opportunity to choose three answers of the responses offered. Most of the respondents chose only one answer, where most frequently, it is the answer on how to become aware and responsible for environment preservation (sustainable thinking for sustainable development) followed with equal distribution by the answer related to having applicable technical knowledge to improve energy efficiency, garbage/waste management, efficient use of working materials, implementation of green procurement, etc. and the answer "None of the above", while only one high school student chose as a single answer having applicable technical knowledge to improve energy efficiency, garbage/waste management, efficient use of working materials, implementation of green procurement, etc. Each of two respondents selected two and four answers offered, respectively.

On the other hand, all employers deem that their employees need "green" skills and almost all chose a multiple answer (three or four of the answers offered), which gives a balanced ratio when summarizing the answers. Namely, employers think that their employees need several of the "green" skills offered, and none of them mentioned any other additional "green" skill. Here, the most frequently selected "green" skill is for their employees to have applicable technical knowledge about energy efficiency improvement, garbage/waste management, efficient use of working materials, implementation of green procurement, etc. This situation can be easily seen in Chart 10, which presents a summary response overview (expressed in relative indicators).

Chart 10: Comparative overview of the aggregate answers to the questions: What "green" skills are you learning? and In your opinion, what "green" skills do your employees need?

What "green" skills are you learning?	What "green" skills do your employees need?
	

Source: Author's own research.

Answers to the questions for high school students about whether they think they would use "green" skills at work and whether they think that acquiring "green" skills would help them find a job are almost evenly distributed between Yes and No answers.

1. Only a few high school students decided to list ideas that could contribute to the development of "green" skills in secondary education, which mainly come down to having environmental actions once a week in each high school, but with the aim of cleaning the municipalities at the national level.

Most of the employers deem that their employees have "green" skills, but during job interviews, they do not ask their candidates if they have "green" skills, nor do they organize training events for "green" skills.

Very few employers decided to list ideas that could contribute to the development of "green" skills in their enterprises and they mainly relate to continuous additional education and training, including constant replenishment with new and positive practices from developed countries and implementation of "green" skills within the company. Some believe that a general upgrade of educational standards in the Republic of North Macedonia is necessary, because with this low level of educational standards, even the best curriculum will not help much.

The interpretation and comparison of exploratory research findings clearly point to the conclusion that both high school students and employers have a high level of awareness of "green" skills. Also, they indicate a discrepancy in the perception of what "green" skill competences secondary school students recognize, value and learn, on the one hand, and what "green" skill competences employers value and require from their employees, on the other hand. Namely, high school students more easily recognize and value "green" skills that include cognitive and interpersonal competences, while employers more often require "green" skills that include intrapersonal and operational competences from their employees.

Also, the findings point to the conclusion that high school students do not have a clearly formed attitude regarding whether "green" skills would improve their employment competitiveness and whether and how much they would use them in their work. Although employers unanimously confirm that "green" skills are important for jobs in their companies, most of them do not ask candidates about "green" skills during job interviews, nor do they organize training on "green" skills for their employees.

CONCLUDING OBSERVATIONS

A number of conclusions can be drawn from the research conducted. Some of the more important ones include the following:

1. In modern conditions, people are becoming increasingly aware of the fact that they need skills that, in the context of their daily economic activities, will ensure the environment quality preservation and energy saving in terms of ensuring sustainability. This is required to ensure more efficient production through the consumption of less energy in order to reduce CO2 emissions, but also to produce larger quantities of energy from renewable sources, all while taking into account the climate change threat as a global issue.

2. Bearing in mind the modern environmental challenges faced by humanity, it becomes clear that the issue of greening the economy has numerous aspects and dimensions. Modern humanity has many advanced technologies, work processes, but also products and services that reduce the negative impact on the environment, thus creating a basis for the economy to gradually become sustainable. However, given the urgency of the environmental crisis, these improvements have to be very extensive. Marginal changes are therefore inadequate because they are almost certain to be counteracted by the rapid population growth combined with the growing per capita consumption.

3. Green economy is any economy that does not generate pollution or waste and is efficient in the use of natural resources required. In this sense, the emergence of green skills that will be in line with the ongoing changes and processes, but also the newly emerging green jobs, should be analyzed. Green skills should gradually contribute to maintaining and restoring the environment quality and avoiding future damage to Earth's eco systems.

4. Green skills are related to the emergence of *green jobs*. Namely, green jobs require a wide range of qualifications, education and skills. Also, green jobs exist not only in the private and public sector, but also in the sphere of scientific and academic institutions, professional associations, etc.

5. There are numerous attempts to identify the content of the term "green skills" and to define them. Starting from the criterion of measurability, the definition according to which a ***green skill*** *is a skill that serves the purpose of providing products or services that improve energy efficiency, extend the use of renewable energy sources or provide support for environmental sustainability* was selected as the most adequate in our case. Such skills represent the basis to perform work in any of the numerous categories of green economic activity, such as: using renewable energy sources and alternative fuels; energy efficiency and conservation; management, prevention and reduction of pollution, waste and greenhouse gases; environment cleanup and remediation, and waste cleanup and reduction; sustainable agriculture and conservation of natural resources; education, regulation, legal compliance, public awareness and training, etc.

6. Integrating *sustainable development and environmental issues* into existing educational and vocational qualifications on the one hand, and the new needs for acquiring competences related to the labor market "greening" on the other hand, is a process of great importance. Understanding how one's profession impacts the environment should be included in the subsystems of the system of education and science. Therefore, sustainable development and environment-related issues should be integrated in existing qualifications towards building new ones in both formal and informal education.

7. *Education* plays an important role in generating changes in individuals' behavior towards the environment. The development of new skills required in the process of transition to a "green" economy takes place through education and educational policies at all levels. Important behavioral attributes such as awareness and environmental protection-related attitudes are developed during primary, secondary and higher education.

8. "Green" skills are required to produce *competent individuals*. This is indicated by a series of examples and experiences in different countries. Namely, by acquiring these skills, individuals become competitive by having "green" characteristics and the ability to maintain ecological balance at the local and global level.

   Certainly, the education system is the best platform that can cover the learning of generic green skills by students. In this context, numerous examples of countries in which steps have been taken to include green skills in education can be noticed around the world, although the issue of inconsistency between educational and economic policies arises.

9. The Republic of North Macedonia faces the challenge of implementing serious reforms in its social system. In the context of these reforms, the reforms in the field of environmental protection, sustainable development, and the issue of energy efficiency are crucial to country's development. Therefore, one of the main *research objectives* in this segment was to analyze individual strategies, reports and respective primary and secondary legislation, in order to find out whether they explicitly or implicitly contain parts that can be of importance to creating an atmosphere for the emergence of green skills in our country.

10. Considering the above, our research interest was focused primarily on strategies in the area of environmental protection, sustainable development, and other strategies related to these issues. In addition, this part reviews the economic development-related strategies and programs, especially the issues of energy efficiency, workforce and employment in our country. The same research principle was applied to the analysis of individual pieces of legislation. The selection was made based on the strategies and legal acts' relevance to the issues studied, i.e. the creation of prerequisites for encouraging green skills. In terms of its time horizon, the analysis takes into account the current strategies and documents, as well as those developed during the last 15-20 years. At the same time, consideration should also be made of our country's intention to integrate and accede to the EU, which in general, is also reflected in the analyzed strategic documents and legal acts drafted in accordance with the EU standards.

11. Starting from the research objective identified, a dilemma arose regarding the ratio between the quantitative and qualitative approach. Given the primary focus of the analysis (strategies and legislation), primacy was assigned to the qualitative approach. In doing so, as numerous studies indicate, this approach does not swerve away from international research practice in this area. Numerous studies show that the qualitative approach is more present and implemented. This may be the result of various reasons such as qualitative changes in the skills required (for example, the greening of existing occupations), or simply because quantitative data is not available.

12. In this analysis, the series of research under the title *Skills for green jobs* was taken as a benchmark. These studies were carried out on two occasions, in 2010 and 2018, in cooperation with the International Labor Organization (ILO) and the European Centre for the Development of Vocational Education (Cedefop). They included 6 European Union Member States, such as: Denmark, Germany, Estonia, Spain, France and the United Kingdom.

13. General impression is that in the strategies, but also in the laws related to the relevant issues in our country (environmental protection, sustainable development, energy efficiency, etc.), the issue of green skills *is not mentioned or it is mentioned very little and indirectly*. However, positive signals of change can be recognized in the current initiatives shown by the Government and specifically the Ministry of Education and Science. Namely, at the ministerial meeting for education and training within the this year's Western Balkans Platform, the focus was on learning about environmental sustainability. In his address, the Minister of Education and Science, Mr. Jeton Shaqiri, emphasized that the initiatives for green and digital Europe were introduced in the new Primary Education Concept in our country, but they would also be involved in the new Law on Secondary Education, as well as in the Secondary Education Concept.

14. A large number of analyses show that the lack of *modern skills* in the workforce is a very impactful factor contributing to the modest performance of the *labor market* in our country. Taking targeted and incentivizing activities by the relevant policymakers in the direction of improving and advancing the skills would have a significant contribution towards increasing workforce productivity and quality, and it would certainly help to further reduce unemployment. In this sense, the advancements in both legal and institutional terms are very important.

15. During the last 15 years, Macedonian society has seen an increased interest in the issues of *energy efficiency (EE)* and the use of *renewable energy sources (RES)*. This fact is supported by a range of activities relating to the modest but continuous penetration of RES, and also the increased and relatively improved energy efficiency. These events send positive signals in terms of creating an atmosphere for the workforce to acquire green skills. However, it is limited due to the existence of some shortcomings in relation to raising the energy efficiency issue (weak economic power of the population for energy efficiency investments; complex secondary legislation on energy efficiency and use of RES; questionable institutional capacities; low energy efficiency in production, transport, energy distribution and consumption; as well as methodological barriers regarding the recording of green jobs, and consequently, green skills as relevant categories).

16. On the other hand, in the Republic of North Macedonia there are opportunities to implement *energy efficiency* projects and thus create green jobs and green skills. Some of the more significant ones are the following: Macedonia's membership in the Energy Community; the possibility of additional employment in the energy sector and engagements of other domestic companies; the fact that energy efficiency is economically feasible; certainly, the high consumption of electricity in households (in fact, over the years, the low electricity price has led to its relatively high share in the total energy consumption in households and the economy; this growth was continuous, even twice as high compared to that of the EU countries, but the current energy crisis imposed the necessity of a serious reduction in electricity consumption among all consumers). The events mentioned have a strong effect in the direction of creating a positive atmosphere for acquiring green skills not only among the workforce engaged, but even more so among young people who are in the process of schooling in secondary vocational education.

17. Based on the obligations that the accession process to the EU will bring, it is realistic to expect that Macedonian *industrial companies* will very soon face demands for a serious remediation of their negative impacts on the environment. It is about using "best available techniques" according to the EU Industrial Emissions Directive. In addition, polluting industrial companies will be required to pay attention to energy efficiency (if this is not already their regular practice in view of the developments in the last few months followed by the energy crisis). All this creates space for creating green skills in this sector.

18. Some situation analyses in the *construction sector* until a few years ago indicated insufficient interest of construction companies in increasing their activities in terms of EE and greater use of RES. The pressures coming from higher energy prices and the need for training of workers in the area of EE and RES, have partially negatively affected the level of profitability and have increased construction costs. The low interest in training the workers stems from the additional costs for companies that arise due to sending their employees to training. However, construction still retains the role of a sector where there is a significant space for creating green skills among the workforce.

19. Considering that 40 percent of the Macedonian population is rural, where a large part thereof is having limited opportunities of employment in non-agricultural activities, a significant part of this population can be trained in green skills, given the confirmed intentions for the development of our *agriculture* to move in the direction of organic production. The data on the Macedonian agriculture's pressure on the environment and climate change can serve as a confirmation of the previous point. Namely, agriculture has a significant impact through its ammonia emissions in the air and greenhouse gas emissions.

20. International experiences speak of a generally weak and insufficient presence of green skills in vocational education and training (VET). Basically, this is a consequence of the mismatch of VET with environmental protection policies and governemnt development strategies, but also the mismatch between VET institutions and the economy. A step forward in this field was made in our country by the reforms of vocational technical education in 2019 supported by the World Bank, where almost every qualification contains a Syllabus on Protection of Natural and Working Environment that is studied individually and compulsorily, but also through a cross-curricular approach of addressing this matter in vocational curricula.

21. The system of vocational education and training should correspond to the economic, demographic and cultural environment. In this context, the assessment of workforce and skills development should follow the logic of local development and the local economy (Local Economic Development – LED). The planning of educational profiles/ qualifications and skills that will be required in the future should start from local needs and development plans. Certainly, green skills should also be included in this context, given that environmental protection is a significant segment of LED. As a matter of fact, the issues of environmental protection and sustainable development are inevitable elements of the local development strategy of any local government, and this is also supported by the competences devolved by the *Law on Vocational Education and Training* (2006) to Municipal Councils and the Council of the City of Skopje.

22. Green skill creation is usually not a simple process. In the complex everyday life, *barriers* often appear that either directly or indirectly discourage the opening of processes to create such skills. Barriers occur both on the demand side for such skills and on the supply side. Certainly, the state and its institutions must not be forgotten, which by their (in)adequate engagement can act as a disincentive. On the demand side, a mention may be made of companies facing the need for green skills in their business operations (for example, construction companies, manufacturers and suppliers of construction materials and technologies, etc.), as well as households. On the supply side, institutions in the secondary vocational education subsystem can be indicated.

    a. The inadequate setup and inadequate organization of the relevant *state* institutions can be a serious obstacle to the process of creating green qualifications and green skills. This usually results from the *low institutional capacity* of state institutions. This is compounded by the *lack of coordination between competent institutions* (ministries and agencies) and stakeholders, which could further delay or even

suspend the implementation of strategic guidelines in various areas. Certainly, this obstacle can be overcome by closer cooperation between agencies regarding the design and implementation of strategic activities.

b. As for the *demand side* for such skills, *the lack of information and knowledge about current global trends and the impossibility of following them, given the low competitiveness*, often appear as an obstacle. When faced with uncertainty and risk, companies tend to make simple decisions in order to meet their minimum needs.

c. Market liberalization brings positive signals to the creation of green skills (for example, through the positive energy efficiency impact). However, we still do not have a sufficient number of specialized economic entities through which these signals will be transferred to the educational system. In the case of energy efficiency, it is about the promotion of professional energy audits and energy services in order to provide access to competitive advice on energy efficiency improvement. Programs to train energy efficiency professionals can help remove this barrier.

d. *Economic crises and recessions* have a negative impact on the emergence of new green skills because they lead to a change in the priorities of companies, which are often forced to rationalize their costs. Hence, the current economic crisis is reflected in cost cutting and reduced investments in the professional development of employees in economic entities. This applies to companies of all sizes, including large ones, but it is no surprise that SMEs are most affected.

e. If one considers the mobility of the labor force and its openness to the possibilities offered by the European Union labor market, then there is an understandable restraint on the part of a large number of companies and employers in our country in view of significant investments in continuous professional training and qualifications for their employees. In this way, another obstacle with a strong impact on the creation of new modern qualifications and skills is encountered. Namely, *the migration of the labor force to other countries, especially to neighboring countries and the EU*, is a kind of "export" of qualifications outside the country. The reasons for such migrations should be sought in the differences in wages levels, but also in the working and living conditions between our country and the migrants' target country, as well as in the EU Member States' policies to attract qualified labor.

f. *Gray economy* also appears as an obstacle on the demand side, which can discourage the emergence of green skills. Namely, the workforce engaged in activities covered by the informal economy, usually cannot qualify for access to formal training organized and offered by relevant state institutions.

g. Obstacles that may appear on the *supply side* of green skills basically relate to the vocational education and training subsystem. The national education system in certain cases shows the need for additional skills training to be provided to teachers. Also, these training needs should be envisaged by the respective institutions, and this should result from the cooperation between stakeholders (here we mean the cooperation between training and education institutions, professional chambers and associations, non-governmental organizations and the Government). *Cooperation with the business sector and business actors* can help a lot in this direction. The growing number of dual education examples resulting from the cooperation of the secondary vocational education subsystem with the chambers of commerce, is a confirmation that this is a very important practice.

23. From the primary and secondary data research procedures conducted and the knowledge gained therefrom, a general conclusion can be drawn that in secondary vocational education in the Republic of North Macedonia, relevant contents on "green" economy, sustainable development, environmental protection and acquiring "green" skills are already integrated into the curricula, but there is a real possibility and need for improving this situation and deepening this integration.

24. From the review and analysis of existing documents, regulations and programs, it can be concluded that secondary vocational education in the Republic of North Macedonia, as part of the educational system, ensures individual personal development and trains workforce with professional competences. This is based on the following principles: inclusiveness, quality, relevance, employability, entrepreneurship, where, in line with the modern and dynamic labor market requirements, the principle of taking care of the environment and sustainability should be integrated quite naturally. This would enable secondary vocational education students, in addition to acquiring the qualifications required, to also gain adequate knowledge that will be the basis for acquiring "green" skill competences, thus facilitating their inclusion in the competitive labor market. Namely, according to the 2020 Labor Market Skills Needs Survey in the Republic of North Macedonia, there is a need for staff with secondary vocational education in almost all activities.

25. From the analysis of the Guide through the qualifications in vocational education, it can be concluded that in most occupations or departments, students, to some extent get equipped with sustainability and environmental protection knowledge and skills ("green" skills), but not in all educational profiles/qualifications belonging to one occupation/department. Namely, environmental protection qualifications and skills ("green" skills) are acquired in 36% of the total number of educational profiles/qualifications, with a higher share of educational profiles/qualifications in four-year vocational education, whereby no qualifications with "green" skill competences are acquired in the two-year vocational education.

26. From the analysis determining the level of "greenness" of vocational curricula for 18 different educational profiles/qualifications of 18 different occupations/departments, the following conclusions can be drawn:

    a. Half of the analyzed vocational curricula or 50% thereof are of low "greenness", 44% are of medium "greenness" and 6% are of high "greenness";

    b. Medium green curricula dominate with 62% among the three-year educational profiles;

    c. Among four-year vocational profiles, those with low greenness dominate with 80%.

27. From the in-depth analysis of a total of 351 vocational courses and the determined levels of integration of contents on "green" economy, sustainability and environment identified in 91 vocational courses, the following conclusions can be drawn:

    a. More than half of the vocational courses analyzed, or 59%, have a low level (1) of integration of contents on "green" economy, sustainability, environmental protection and "green" skills. This mainly includes the vocational subject areas of: Learning through Work with an Employer and Practical Instruction.

    b. 15% of vocational courses are with an initial level (2) of integration of contents on "green" economy, sustainability, environmental protection and "green" skills. This also includes the two subjects of: Learning through Work with an Employer and Practical Instruction.

c. 9% of vocational courses have a medium level (3) of integration of contents on "green" economy, sustainability, environmental protection and "green" skills. This also includes 2 Practical Instruction courses.

d. With a good level (4) of integration of content related to "green" economy, sustainability, environmental protection and "green" skills are 7% of vocational courses. This includes 2 Practical Instruction courses.

e. A strong level (5) of integration of content on "green" economy, sustainability and environmental protection, including "green" skills, can be found in 10% of the vocational subjects. Most of them are elective subjects and there is not a single subject of Learning through Work with an Employer and Practical Instruction among them.

28. By reviewing the curricula of educational profiles/qualifications that were not included in the in-depth analysis, subject areas were identified that, according to their names, give an indication that they have a good (4) and strong (5) level of integration of content on "green" skills, sustainability and environment. This further points to the conclusion that in vocational education there is a potential for acquiring qualifications with "green" skills and that a new, amended and supplemented edition of the Guide through the qualifications in vocational education is needed, where the educational profiles/qualifications that include courses with a good (4) and strong (5) level of integration of content on "green" skills, sustainability and environment would be added.

29. Based on the above observations, it can be concluded that in the secondary vocational education in the Republic of North Macedonia, there are mainly two approaches through which curricula "greenness" is achieved, including:

    a. Vocational courses that are completely "green" and designed to develop awareness of sustainability and environmental protection, where the level of relevant content integration is 3 to 5 (medium to strong integration).

    b. Integration of contents on "green" economy, sustainability and environmental protection in vocational subject areas, mainly in their modular unit components (Contents and Concepts; Activities and Methods), where the level of relevant content integration is 1 to 3 (low to medium integration).

30. The situation presented indicates that some initial efforts have been made in secondary vocational education in the Republic of North Macedonia, which is the basis for further integration of contents for the acquisition of knowledge and competences related to "green" economy, sustainability and environmental protection. The findings of the Labor Market Skills Needs Survey in the Republic of North Macedonia, on the one hand, and the low share of identified curricula with a high level of "greenness" and vocational courses with a good and strong level of "greenness" therein, on the other hand, clearly point to the conclusion that there is a need and opportunity to integrate "green" economy skills in secondary vocational education.

31. The greatest possibility and need for integrating "green" skills is found in the subject areas of Learning through Work with an Employer and Practical Instruction, which were identified to have a low level (1) of integration of contents on "green" economy, sustainability and environmental protection. Namely, since by definition, skills include the possession of practical skills for manual work and use of methods, materials, tools and instruments, in order to acquire "green" skills in vocational education, it is necessary to integrate adequate practices in the curricula related to the subject areas specified. This will enable students to apply the knowledge (competences) acquired for "green" economy, sustainability and

environmental protection and to qualify for performing specific "green" work tasks from some vocational profile or occupation.

32. Such possibilities of integrating content on "green" economy, sustainability and environmental protection and acquiring "green" skills should be identified through the following:

    a. Devote attention to the development of curricula and syllabi regarding secondary vocational education activities, and integrate sustainability and environmental protection needs in the goals and objectives thereof, covering them in the respective teaching areas, contents and expected learning outcomes, content and concepts, activities and methods, including assessment criteria. This is particularly required in the relevant vocational curricula where a low and initial level of integration of content on "green" economy, sustainability and environmental protection was identified;

    b. Analyze the possibility of offering the existing completely "green" vocational courses, designed to develop awareness of sustainability and environmental protection, as electives in all three-year and four-year educational profiles/qualifications in the occupation/department, and also generalize and adapt them to become elective subjects in a number of related vocations/departments;

    c. Train the staff to transfer knowledge and skills on "green" economy, sustainability and environmental protection;

    d. Develop and publish customized textbooks and teaching aids;

    e. Provide adequate spatial conditions, teaching methods and aids, including specialized classrooms where students would be able to practically and directly learn and practice "green" skills;

    f. Devise and define concrete procedures and work tasks for acquiring practical "green" skills in real conditions through special forms of teaching, ferial practice and learning through work with an employer, in cooperation with the employers in every occupation.

33. From the unstructured observation, the conclusion can be drawn that competent institutions in the country are aware of the fact that knowledge about environmental protection and its integration should be promoted in all sectors and all sectoral policies. Also, the need for a quick and fair transition to a "green" economy is evident, and the expectation for the creation of new "green" jobs, i.e., almost 80,000 by 2030, is realistic. This is undoubtedly a great opportunity for vocational education, which through the integration of "green" skills in its educational process, would enable qualification, but also retraining and upskilling of professional staff that would be the workforce with adequate vocational training and skills to keep abreast with current needs, while possessing understanding and knowledge, and taking innovative approach and applying innovative techniques and technologies in the manufacturing processes. At the same time, cooperation with the business sector plays a major role in the promotion of "green" skills.

34. The findings of the semi-structured interview conducted with CVET and BDE representatives point to the conclusion that the relevant actors from state institutions working in the field of education and within their own competences and capacities, are continuously making efforts towards the development of vocational education, especially in the direction of matching it with the labor market. In this sense, the aspects of education on sustainable

development and "green" skills are integrated in the models/mechanisms developed to enhance professional competences and practical skills of vocational education staff. Also, sustainable development and "green" skills are already integrated in the relevant documents adopted, such as the Concept of Learning through Work and the Occupation Standards Form, including specific cross-curricular integration of "green" skills content in a number of curricula for many educational profiles/qualifications from most occupations/ departments. In addition, CVET together with employers, through a collaborative approach to planning and implementation, and flexible curricula setup related to Learning through Work with an Employer, enables the involved stakeholders (the vocational school and the company) to integrate tasks, and thus, activities for acquisition of "green" skills. The same can be done during the realization of ferial practice, and there is an opportunity to increase "green" skills among students in the area of Content programmed by the school and implemented within two hours per week for each class, in each year. In order to implement more successfully the aspects of education on sustainable development and "green" skills in the educational process, CVET also provides adequate professional training to teachers of vocational and theoretical subjects, and based on the needs expressed by teachers to improve their competencies through counseling, coaching and mentoring, "green" skills could also become part of the annual Professional Development Program for teachers and professional associates from primary and secondary schools, which is jointly developed by the Bureau for Development of Education (BDE), the State Education Inspectorate (SEI) and CVET. In this direction, it is necessary to underscore the information obtained from the BDE that the topic of education on sustainable development and green skills is covered in the Long-term Plan regarding the training needs of both primary and secondary schools' educational staff (2021-2023). However, despite the fact that when developing the new and revised standards of occupations and qualifications, contents related to sustainable development and "green" skills are taken into account, they are not equally represented in all educational profiles/qualifications and in all occupations/ departments. Also, aspects that should be given additional attention are the enrichment of the Platform for Professional Development of Vocational Education Staff, with recorded materials and training to support teaching staff in their realization of education on sustainable development and "green" skills, as well as monitoring and analysis of the possibility of practicing "green" and sustainable development skills when students implement their practical training with employers. The improvement of these aspects could certainly be supported by CVET's enhanced activity in the area of international cooperation and exchange of experiences, knowledge, attitudes and ideas for sustainable development and "green" skills in vocational education.

35. The general realization made from the exploratory research conducted suggests that among high school students from vocational schools and employers in the Republic of North Macedonia there is a fairly high level of awareness of "green" skills, but the potential for their implementation in vocational education is not is fully utilized. The exploratory research findings show that high school students and employers have a shaped "green" skill awareness, but in terms of their opinions and attitudes, they differ in the perception of what "green" skills they learn or respectively require from employees. Namely, high school students more easily recognize and value "green" skills with cognitive and interpersonal competences, while employers more often require "green" skills with intrapersonal and operational competences from their employees. This points to the conclusion that additional research is needed to establish the reasons for this inconsistency and find appropriate ways to overcome it. The realization that high school students do not have a clearly formed attitude regarding whether "green" skills would improve their employability and whether and how much they would use them at work is also indicative.

36. The general conclusion is that in the near future, dedication and serious commitments are required to fully integrate the concept of "green" economy, sustainability and environmental protection in secondary vocational education, both in theoretical and practical teaching.

Commitments to continuing and upgrading the concept of "green" skills in secondary vocational education should not be just "lip service", but they should enable real progress in "greening" the jobs in our country. Priority should be given to the profiles covered by vocational training (of two years) and vocational education for occupations (of three years), which also corresponds to the findings of the Labor Market Skills Needs Survey in the Republic of North Macedonia. Namely, students with vocational education for a certain occupation can get immediately involved in the labor market. Here, not all students will choose to continue their education at colleges. Therefore, secondary vocational education is an opportunity for these students to acquire qualifications for "green" skills through formal education, which they would then apply in the performance of their work tasks in the respective professions and sectors in the economy.

37. From the theoretical and empirical analysis carried out, as well as from the concluding observations, as a general recommendation arises the realization that professional skills are the key to a faster "green" transition of the economy and society in general, so therefore, it is necessary for all stakeholders to actively and intensively work on the development and inclusion of such skills into the curricula and educational processes.

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APPENDICES

Please find the appendices available only on Macedonian language at the following link

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